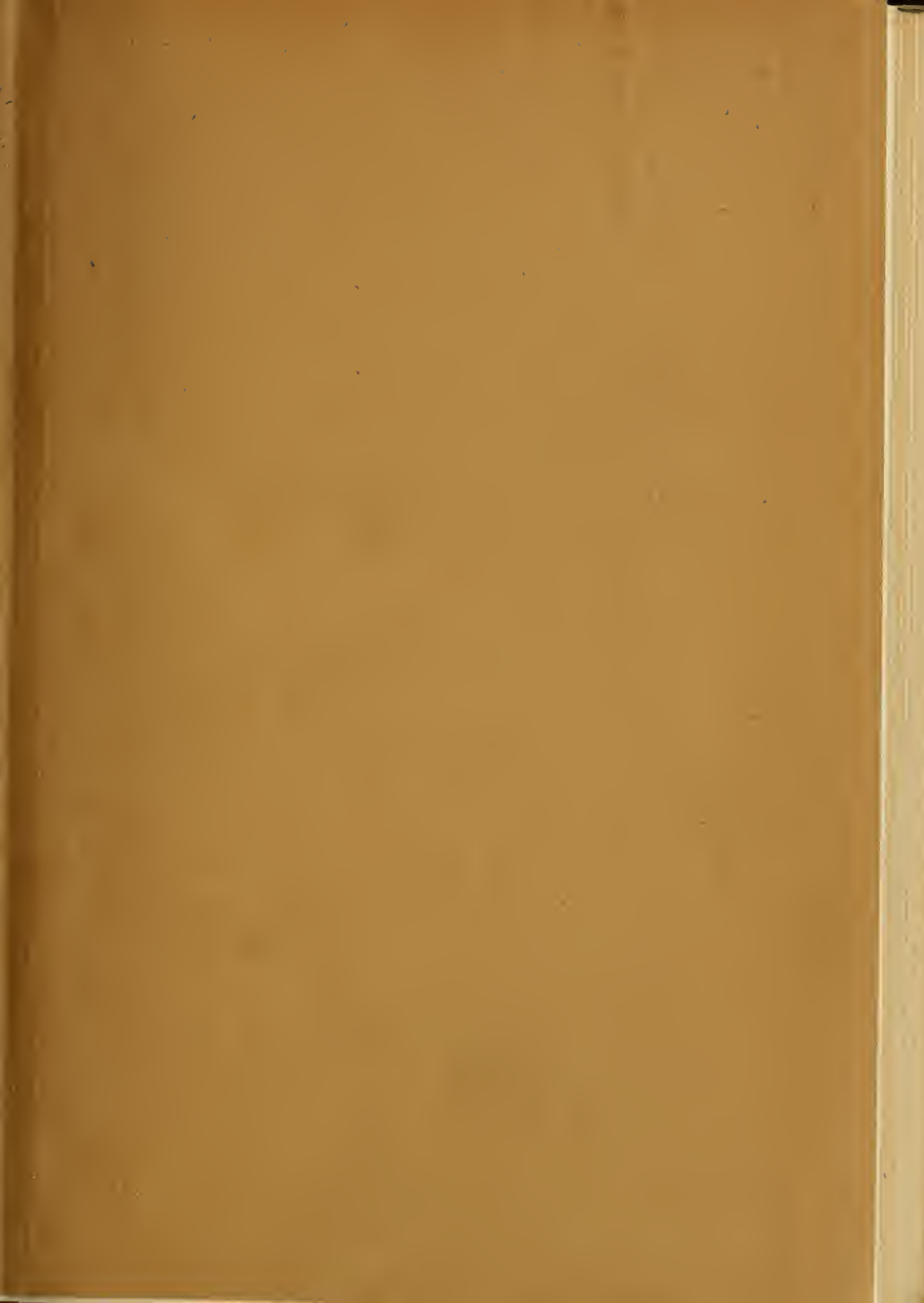


378.73
L52re
1930/31

Lehigh University
Library

Bethlehem, Pennsylvania



378.73
L 52 re
1930/31

Lehigh University Publication

Vol. 5

MARCH, 1931

No. 3

Published monthly during the calendar year by Lehigh University, Bethlehem, Pennsylvania. Entered as second-class matter March 24, 1927, at the Post Office at Bethlehem, Pennsylvania, under the Act of August 24, 1912.

REGISTER, 1930-1931

ANNOUNCEMENT, 1931-1932



BETHLEHEM
PENNSYLVANIA

1930

JULY

S	M	T	W	T	F	S
...
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...

AUGUST

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

SEPTEMBER

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	...	...
28	29	30	...	...	...	...
...

OCTOBER

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

NOVEMBER

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

DECEMBER

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

1932

JANUARY

S	M	T	W	T	F	S
...
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

FEBRUARY

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
...
...

MARCH

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

APRIL

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

MAY

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

JUNE

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

1931

JANUARY

S	M	T	W	T	F	S
...
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

FEBRUARY

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	...
...
...

MARCH

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

APRIL

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

MAY

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

JUNE

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

JULY

S	M	T	W	T	F	S
...
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

AUGUST

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

SEPTEMBER

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	...	...	...	...	...	...
...

OCTOBER

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

NOVEMBER

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	...	...	...	...	...	...
...

DECEMBER

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...
...

UNIVERSITY CALENDAR

1930-1931

1930

Sept. 4, 5, 6, 8 (Thurs.-Mon.).....Examinations for admission
 Sept. 9, 10, 11, 12, 13 (Tues.-Sat.)....Freshman Week
 Sept. 9, 10, 11, 12, 13 (Tues.-Sat.)....Fall re-examinations
 Sept. 10, 3:00 p.m. (Wed.).....First Faculty meeting
 Sept. 15, 16, 17 (Mon., Tues., Wed.)..Undergraduate registration
Sept. 17, 3:30 p.m. (Wed.).....First Semester begins
 Sept. 20 (Sat.).....Graduate registration
 Sept. 29 (Mon.).....Last day for undergraduate registration
 Oct. 1 (Wed.).....Founder's Day (holiday)
 Oct. 11 (Sat.).....Last day for graduate registration
 Nov. 13 (Thurs.).....Mid-semester reports
 Nov. 22 (Sat.).....Lafayette game (holiday)
 Nov. 26, 4:00 p.m. (Wed.).....Thanksgiving holidays begin
 Dec. 1, 7:45 a.m. (Mon.).....Thanksgiving holidays end
 Dec. 20, 12:00 m. (Sat.).....Christmas holidays begin

1931

Jan. 5, 7:45 a.m. (Mon.).....Christmas holidays end
 Jan. 17, 12:00 m. (Sat.).....Instruction ends
 Jan. 19, 8:00 a.m. (Mon.).....Examinations begin
Jan. 28, 6:00 p.m. (Wed.).....Examinations end
 Jan. 30, 31 (Fri., Sat.).....Undergraduate registration
Feb. 2, 7:45 a.m. (Mon.).....Second Semester begins
 Feb. 7 (Sat.).....Graduate registration
 Feb. 12 (Thurs.).....Last day for undergraduate registration
 Feb. 28 (Sat.).....Last day for graduate registration
 March 26 (Thurs.).....Mid-semester reports
 April 1, 4:00 p.m. (Wed.).....Easter holidays begin
 April 9, 7:45 a.m. (Thurs.).....Easter holidays end
 May 18, 19, 20 (Mon.-Wed.).....Senior Arts comprehensive examinations
 May 20, 12:00 m. (Wed.).....Instruction ends
 May 21, 8:00 a.m. (Thurs.).....Examinations begin
May 30, 6:00 p.m. (Sat.).....Examinations end
 June 1 (Mon.).....First Surveying Camp begins
 June 4, 5 (Thurs., Fri.).....Senior re-examinations
 June 6 (Sat.).....Alumni Day
 June 7 (Sun.).....Baccalaureate Sunday
 June 8 (Mon.).....Class Day
June 9 (Tues.).....University Day
 June 10, 11, 12, 13 (Wed.-Sat.).....Examinations for admission
 June 27 (Sat.).....First Surveying Camp ends
 June 29 (Mon.).....Summer Session begins
 June 29 (Mon.).....Second Surveying Camp begins
 July 11 (Sat.).....Second Surveying Camp ends
 Aug. 8 (Sat.).....Summer Session ends

UNIVERSITY CALENDAR—Continued

1931-1932

1931

Sept. 10, 11, 12, 14 (Thurs.-Mon.)...Examinations for admission
 Sept. 14, 3:00 p.m. (Mon.)...First Faculty meeting
 Sept. 15, 16, 17, 18, 19 (Tues.-Sat.)...Freshman Week
 Sept. 15, 16, 17, 18, 19 (Tues.-Sat.)...Fall re-examinations
 Sept. 21, 22, 23 (Mon., Tues., Wed.)...Undergraduate registration
Sept. 23, 3:30 p.m. (Wed.)...First Semester begins
 Sept. 26 (Sat.)...Graduate registration
 Oct. 5 (Mon.)...Last day for undergraduate registration
 Oct. 7 (Wed.)...Founder's Day (holiday)
 Oct. 17 (Sat.)...Last day for graduate registration
 Nov. 19 (Thurs.)...Mid-semester reports
 Nov. 21 (Sat.)...Lafayette game (holiday)
 Nov. 25, 4:00 p.m. (Wed.)...Thanksgiving holidays begin
 Nov. 30, 7:45 a.m. (Mon.)...Thanksgiving holidays end
 Dec. 19, 12:00 m. (Sat.)...Christmas holidays begin

1932

Jan. 4, 7:45 a.m. (Mon.)...Christmas holidays end
 Jan. 23, 12:00 m. (Sat.)...Instruction ends
 Jan. 25, 8:00 a.m. (Mon.)...Examinations begin
Feb. 3, 6:00 p.m. (Wed.)...Examinations end
 Feb. 5, 6 (Fri.-Sat.)...Undergraduate registration
Feb. 8, 7:45 a.m. (Mon.)...Second Semester begins
 Feb. 13 (Sat.)...Graduate registration
 Feb. 18 (Thurs.)...Last day for undergraduate registration
 Mar. 5 (Sat.)...Last day for graduate registration
 Mar. 21 (Mon.)...Mid-semester reports
 Mar. 23, 4:00 p.m. (Wed.)...Easter holidays begin
 Mar. 31, 7:45 a.m. (Thurs.)...Easter holidays end
 May 23, 24, 25 (Mon., Tues., Wed.)...Senior Arts comprehensive examinations
 May 25, 12:00 m. (Wed.)...Instruction ends
 May 26, 8:00 a.m. (Thurs.)...Examinations begin
June 4, 6:00 p.m. (Sat.)...Examinations end
 June 6 (Mon.)...First Surveying Camp begins
 June 9, 10 (Thurs., Fri.)...Senior re-examinations
 June 11 (Sat.)...Alumni Day
 June 12 (Sun.)...Baccalaureate Sunday
 June 13 (Mon.)...Class Day
June 14 (Tues.)...University Day
 June 15, 16, 17, 18 (Wed.-Sat.)...Examinations for admission
 July 2 (Sat.)...First Surveying Camp ends
 July 4 (Mon.)...Summer Session begins
 July 4 (Mon.)...Second Surveying Camp begins
 July 16 (Sat.)...Second Surveying Camp ends
 Aug. 13 (Sat.)...Summer Session ends

BOARD OF TRUSTEES

CORPORATE MEMBERS

REMBRANDT RICHARD PEALE, B.S.....	New York, N.Y.
WARREN ABBOT WILBUR, M.A.....	Bethlehem, Pa.
CHARLES M. SCHWAB, ENG.D., LL.D., D.C.S.....	New York, N.Y.
SAMUEL DEXTER WARRINER, B.S., E.M., ENG.D...	Philadelphia, Pa.
EUGENE GIFFORD GRACE, E.E., ENG.D.....	Bethlehem, Pa.
HARRY C. TREXLER.....	Allentown, Pa.
CHARLES DONNELL MARSHALL, C.E.....	Pittsburgh, Pa.
WILLIAM CARTER DICKERMAN, M.E.....	New York, N.Y.
HOWARD HALE MCCLINTIC, C.E.....	Pittsburgh, Pa.
FRANK RAYMOND COATES, B.S., E.M.....	New York, N.Y.

HONORARY TRUSTEE

HENRY STURGIS DRINKER, E.M., LL.D.....	Merion Station, Pa.
--	---------------------

MEMBERS ELECTED BY ALUMNI

Term Expires

AUBREY WEYMOUTH, C.E. Class of 1894	1931	New York, N.Y.
CLARENCE WALTER HUDSON, C.E., Eng.D. Class of 1889	1932	New York, N.Y.
CADWALLADER EVANS, JR., M.E. Class of 1901	1933	Scranton, Pa.
FRANCIS ROUAUD DRAGO, M.E. Class of 1887	1934	Pittsburgh, Pa.
TOM MERCER GIRDLER, M.E. Class of 1901	1935	Cleveland, O.
ALFRED ROBINSON GLANCY, M.E., Class of 1903	1936	Pontiac, Mich.

OFFICERS OF THE BOARD OF TRUSTEES

President

EUGENE G. GRACE

Secretary and Treasurer

WALTER R. OKESON

Executive Committee

EUGENE G. GRACE, *Chairman*

WARREN A. WILBUR

HARRY C. TREXLER

CHARLES D. MARSHALL

WILLIAM C. DICKERMAN

SAMUEL D. WARRINER

Committee on Buildings and Grounds

CHARLES D. MARSHALL, *Chairman*

AUBREY WEYMOUTH

FRANCIS R. DRAVO

Committee on Finance and Investments

SAMUEL D. WARRINER, *Chairman*

CHARLES M. SCHWAB

HARRY C. TREXLER

Committee on Endowment

WILLIAM C. DICKERMAN, *Chairman*

EUGENE G. GRACE

HENRY S. DRINKER

CHARLES D. MARSHALL

AUBREY WEYMOUTH

UNIVERSITY FACULTY

CHARLES RUSS RICHARDS, M.M.E., ENG.D., LL.D.

President

HENRY STURGIS DRINKER, E.M., LL.D.

President Emeritus

NATT MORRILL EMERY, A.B., M.A., LITT.D.

Vice-President and Comptroller

CHARLES MAXWELL McCONN, B.A., M.A., LITT.D.

Dean

CHARLES LEWIS THORNBURG, C.E., PH.D., LL.D.

Emeritus Professor of Mathematics and Astronomy

CHARLES JAMES GOODWIN, A.B., A.M., PH.D.

Professor of Greek

Head of the Department of Greek

HOWARD ECKFELDT, B.S., E.M.

Professor of Mining Engineering

Head of the Department of Mining Engineering

Director of the Curriculum in Mining Engineering

PHILIP MASON PALMER, A.B.

Professor of German

Head of the Department of German

Director of the College of Arts and Science

BENJAMIN LEROY MILLER, A.B., A.M., PH.D.

Professor of Geology

Head of the Department of Geology

WINTER LINCOLN WILSON, C.E., M.S.

J. T. Stuart Professor of Railroad Engineering

ROBERT WILLIAM HALL, PH.B., B.A., M.A., PH.D.

Professor of Biology

Head of the Department of Biology

PERCY HUGHES, A.B., A.M., PH.D.

Professor of Philosophy and Psychology

*Head of the Department of Philosophy, Psychology,
and Education*

CHARLES SHATTUCK FOX, A.B., A.M., LL.B., PH.D.

Professor of Romance Languages

Head of the Department of Romance Languages

HOWARD ROLAND REITER, B.A., M.A.

Professor of Physical Education

Head of the Department of Physical Education

HARRY M. ULLMANN, A.B., PH.D.

Professor of Chemistry and Chemical Engineering

*Head of the Department of Chemistry and Chemical
Engineering*

*Director of the Curricula in Chemistry and Chemical
Engineering*

JOHN HUTCHESON OGBURN, C.E.

Professor of Mathematics and Astronomy

ARTHUR WARNER KLEIN, M.E.

Professor of Mechanical Engineering

RALPH JUSTIN FOGG, B.S.

Professor of Civil Engineering

(Absent on leave, 1930-1931)

FRED VIAL LARKIN, B.S., M.E.

Professor of Mechanical Engineering

Head of the Department of Mechanical Engineering

*Director of the Curricula in Mechanical Engineering and
Industrial Engineering*

MYRON JACOB LUCH, B.A., M.A., PH.D.

Professor of English

HORACE WETHERILL WRIGHT, A.B., PH.D.

Professor of Latin

Head of the Department of Latin

VAHAN SIMON BABASINIAN, A.B., A.M., PH.D.

Professor of Organic Chemistry

THOMAS EDWARD BUTTERFIELD, M.E., C.E.

Professor of Heat Power Engineering

BRADLEY STOUGHTON, PH.B., B.S.

Professor of Metallurgy

Head of the Department of Metallurgy

Director of the Curriculum in Metallurgical Engineering

RAYMOND COOLEY BULL, B.S., A.B., M.D.

Director of Students' Health Service

NEIL CAROTHERS, B.A., PH.D.

Professor of Economics

*Head of the Department of Economics, Sociology, and
Business Administration*

Director of the College of Business Administration

HOWARD SEAVOY LEACH, A.B., M.A.

Librarian

LAWRENCE HENRY GIPSON, A.B., B.A., (Oxon.),
PH.D., F.R.H.S.

Professor of History and Government

Head of the Department of History and Government

ROY BURFORD COWIN, A.B., M.A.

Professor of Accountancy

ROBERT METCALF SMITH, A.B., A.M., PH.D.

Professor of English

Head of the Department of English

MILTON CALEB STUART, B.S. IN M.E., M.E.

Professor of Experimental Mechanical Engineering

JOSEPH BENSON REYNOLDS, B.A., M.A., PH.D.

Professor of Mathematics and Theoretical Mechanics

CHARLES CLARENCE BIDWELL, A.B., PH.D.

Professor of Physics

Head of the Department of Physics

Director of the Curriculum in Engineering Physics

TOMLINSON FORT, A.B., A.M., PH.D.

Professor of Mathematics

Head of the Department of Mathematics and Astronomy

HERBERT MAYNARD DIAMOND, B.A., PH.D.

Professor of Economics

WILLIS APPLEFORD SLATER, B.S., M.S., C.E.

Research Professor of Engineering Materials

Director of the Fritz Engineering Laboratory

STANLEY SYLVESTER SEYFERT, E.E., M.S.

Professor of Electrical Engineering

Acting Head of the Department of Electrical Engineering

Acting Director of the Curriculum in Electrical Engineering

JAMES SCOTT LONG, CH.E., M.S., PH.D.

Professor of Inorganic Chemistry

In charge of Archer-Daniels-Midland Company and William O.

Goodrich Company Research

STANLEY JUDSON THOMAS, B.S., M.S., M.A., PH.D.

Professor of Bacteriology

(Absent on leave, first semester 1930-1931)

GEORGE BARTLETT CURTIS, B.A., A.M.

Registrar and Associate Dean

LLOYD LEROY SMAIL, A.B., A.M., PH.D.

Professor of Mathematics

MATTHEW HENRY THOMLINSON, LIEUT. COL., INF., U. S. A.

Professor of Military Science and Tactics

Head of the Department of Military Science and Tactics

ALPHA ALBERT DIEFENDERFER, B.S. IN CHEM., M.S.

Professor of Assaying and Quantitative Analysis

HALE SUTHERLAND, A.B., S.B.

Professor of Civil Engineering

Head of the Department of Civil Engineering

Director of the Curriculum in Civil Engineering

ASSOCIATE PROFESSORS

JOHN EUGENE STOCKER, B.S., M.S.

Associate Professor of Mathematics and Astronomy

SYLVANUS A. BECKER, C.E., M.S.

Associate Professor of Civil Engineering

MERTON OTIS FULLER, C.E.

Associate Professor of Civil Engineering

ROBERT PATTISON MORE, B.A., M.A.

Associate Professor of German

JACOB LYNFORD BEAVER, E.E., M.S.
Associate Professor of Electrical Engineering
(Absent on leave, 1930-1931)

SYDNEY MACGILLVARY BROWN, B.A., M.A. (Oxon.)
Associate Professor of History

PAUL LEVERNE BAYLEY, B.A., M.A., PH.D.
Associate Professor of Physics

JOHN MILTON TOOHY, B.A., M.A.
Associate Professor of Romance Languages

ERIC SPENCER SINKINSON, B.Sc., D.I.C., F.C.S.
Associate Professor of Ore Dressing and Fuel Technology

WARREN WALTER EWING, B.S., M.S., PH.D.
Associate Professor of Physical Chemistry

ALLISON BUTTS, A.B., S.B.
Associate Professor of Metallurgy

FREDERICK ALDEN BRADFORD, A.B., M.A., PH.D.
Associate Professor of Economics

EARL LEVERNE CRUM, A.B., A.M., PH.D.
Associate Professor of Latin

HAROLD VICTOR ANDERSON, B.Ch.E., M.S.
Associate Professor of Chemistry

KENNETH WORCESTER LAMSON, A.B., PH.D.
Associate Professor of Mathematics

HARVEY ALEXANDER NEVILLE, A.B., A.M., PH.D.
Associate Professor of Chemistry

MAX PETERSEN, B.S., M.A., PH.D.
Associate Professor of Physics

EDWIN RAYMOND THEIS, Ch.E., PH.D.
Associate Professor of Chemical Engineering

FREDERICK CREEDY, A.C.G.I.
Research Associate Professor of Electrical Engineering

ASSISTANT PROFESSORS

GEORGE CARLTON BECK, A.C.

Assistant Professor of Quantitative Analysis

LEGRAND REX DROWN, Sc.B., M.A.

Assistant Professor of Education

HOMER GRIFFIELD TURNER, B.S., M.S.

Assistant Professor of Geology

HOWARD DIETRICH GRUBER, E.E., M.S.

Assistant Professor of Electrical Engineering

HARRY GORDON PAYROW, B.S. IN C.E.

Assistant Professor of Civil Engineering

AUGUSTUS HENRY FRETZ, Ph.B., C.E., M.S.

Assistant Professor of Geology

FAY CONANT BARTLETT

Assistant Professor of Physical Education

EUGENE HENRY UHLER, C.E.

Assistant Professor of Civil Engineering

HALFRED CHENEY BROWN, A.B., DOCTEUR EN DROIT

Assistant Professor of Romance Languages

GILBERT EVERETT DOAN, Ch.E., Ph.D.

Assistant Professor of Metallurgy

EDGAR HEISLER RILEY, A.B., Ph.D.

Assistant Professor of English

ARCHIE ROSCOE MILLER, B.S., M.S.

Assistant Professor of Electrical Engineering

GEORGE DEWEY HARMON, B.A., M.A., Ph.D.

Assistant Professor of History

NELSON SHERK HIBSHMAN, B.S., M.S.

Assistant Professor of Electrical Engineering

PRESTON BANKS CARWILE, A.B., M.A., Ph.D.

Assistant Professor of Physics

GARTH AHYMAN HOWLAND, B.A., M.A.

Assistant Professor of the Fine Arts

ERNST BERNHARD SCHULZ, B.S., M.A., PH.D.
Assistant Professor of Government

CYRIL DEWEY JENSEN, B.S. IN C.E., M.S.
Assistant Professor of Civil Engineering

RAFAEL ARCANGEL SOTO, B.S., B.A., M.A.
Assistant Professor of Romance Languages

CURTIS DANIEL MacDOUGALL, A.B., M.S.
Assistant Professor of Journalism

WARD LESLIE BISHOP, A.B., A.M., PH.D.
Assistant Professor of Economics

MAXIMILIAN CLAY, B.S. IN E.E., CAPT., INF., U. S. A.
Assistant Professor of Military Science and Tactics

BURGESS HILL JENNINGS, B.ENG., M.S.
Assistant Professor of Mechanical Engineering

FRIEDRICH OTTO KEGEL, A.M.
Assistant Professor of German

HOWARD GARRETT RHOADS, B.A., M.A.
Assistant Professor of English

FRANK CHESTER BECKER, A.B.
Assistant Professor of Philosophy

CHARLES WELLINGTON SIMMONS, B.Sc., M.S.
Assistant Professor of Chemical Engineering

WALDEMAR JOSEPH TRJITZINSKY, A.B., M.A., PH.D.
Assistant Professor of Mathematics
(Absent on leave, 1930-1931)

CHARLES EDWARD BERGER, B.S., PH.D.
Assistant Professor of Physics

ROBERT DOMINICK BILLINGER, CH.E., M.S., PH.D.
Assistant Professor of Chemistry

ELMER CLARK BRATT, A.B., A.M.
Assistant Professor of Economics

AUSTIN ROGERS FREY, S.B., M.A., PH.D.
Assistant Professor of Physics

HARRY ALBERT HARING, JR., A.B., M.A., PH.D.
Assistant Professor of Economics

CHARLES ROZIER LARKIN, B.A., M.A., PH.D.
Assistant Professor of Physics

PERCY LEE SADLER, CAPT., INF., U. S. A.
Assistant Professor of Military Science and Tactics

THOMAS HUGER HAZLEHURST, JR., A.B., PH.D.
Assistant Professor of Chemistry

CARL ELMER ALLEN, B.S., M.S., PH.D.
Assistant Professor of Accountancy

JAMES LARMOUR GRAHAM, B.A., B.D., M.A., PH.D.
Assistant Professor of Psychology

CHARLES HENRY KECK, CAPT., ORD., U. S. A.
Assistant Professor of Military Science and Tactics

ALEXANDER WALKER LUCE, M.E.
Assistant Professor of Machine Design

JOHN KIRKLAND RICE, CAPT., INF., U. S. A.
Assistant Professor of Military Science and Tactics

CLARENCE ALBERT SHOOK, A.B., A.M., PH.D.
Assistant Professor of Mathematics

LECTURERS

EDWARD HIGGINSON WILLIAMS, JR., B.A., E.M., A.C.,
LL.D., Sc.D., F.G.S.A.
Lecturer on Mining and Geology

HARRY FREDERICK HOFFMAN, M.D.
Lecturer on Mental Hygiene

EDWIN J. PRINDLE, M.E., LL.B., LL.M., LL.D.
Lecturer on Patent Law

ROY A. LEWIS, M.E.
Lecturer on Plant Management

THADDEUS MERRIMAN, C.E.
Lecturer on Hydraulic Engineering and Water Supply

- NORMAN G. REINICKER, M.E.
Lecturer on Power Plant Engineering
- WILLIAM BOWIE, B.S., C.E., M.A., Sc.D.
Lecturer on Isostasy and Geodesy
- HENRY I. KLOPP, M.D.
Lecturer on Mental Hygiene

INSTRUCTORS

- MORRIS EUGENE KANALY
Instructor in Physical Education
- JUDSON GRAY SMULL, B.S., M.S.
Instructor in Chemistry
- JOSEPH MAX ANDRESS, B.S. IN E.E.
Instructor in Electrical Engineering
- ARTHUR RICHARD BRAUNLICH, JR., A.B., A.M.
Instructor in English
- DAVID GALLUP SCOTT, B.A., M.A.
Instructor in Romance Languages
- GEORGE DORMER FARNE, A.B., M.A.
Instructor in Romance Languages
- GEORGE ALVIN FINCH, B.A., M.A.
Instructor in English
- LELAND SPENCER BARNES, A.B., M.S.
Instructor in Mathematics and Astronomy
- CARL ARTHUR KEELER, A.B., M.A.
Instructor in Mathematics
- JEROME MARTIN MILLER, B.S., M.S.
Instructor in Chemistry
- RUSSELL BENJAMIN PARKS, A.B., A.M.
Instructor in English
- EUGENE HULSE SLOANE, B.A., M.A.
Instructor in English

WILLIAM LEVI KICHLIN, B.A., M.S.

Instructor in Mathematics

FREDERIC ALLEN SCOTT, B.S., M.S.

Instructor in Physics

HENRY HARE CARTER, B.S.

Instructor in Romance Languages

WILBER EDWARD HARVEY, MET.E., M.S.

Instructor in Metallurgy

JOHN ROBERT CONNELLY, B.S. IN M.E., M.S.

Instructor in Mechanical Engineering

RICHARD HENRY CRUM, A.B., A.M.

Instructor in Latin

DALE HARTZLER GRAMLEY, A.B., M.S.

Instructor in Journalism

CLEMENT LONG HENSHAW, B.S. IN PHYS., M.A.

Instructor in Physics

FREDERICK TAYLOR HOLMES, B.A.

Instructor in Physics

DANIEL CLARK LEWIS, JR., A.B., A.M.

Instructor in Mathematics

STUART BARTLETT MEAD, B.S. IN BUS. AD., A.M.

Instructor in Accountancy

HILL REID NETTLES, C.E.

Instructor in Civil Engineering

JOHN ALLEN OSTEEEN, B.S.

Instructor in Physics

ROBERT STONE, B.P.E., M.A.

Instructor in Psychology

GEORGE BOYD THOM, M.E.

Instructor in Mechanical Engineering

RICHARD JOHN DEGRAY, CH.E., M.S.

Instructor in Chemistry

MICHAEL ANTHONY FARRELL, B.S., M.S.
Instructor in Bacteriology

RALPH NEWCOMB VANARNAM, E.E., M.S.
Instructor in Mathematics and Astronomy

FRANK SWAN BEALE, B.S., M.S.
Instructor in Mathematics

EDWARD HUTCHINS CUTLER, A.B., A.M., PH.D.
Instructor in Mathematics

SIMON DEPTULA, A.B., M.A.
Instructor in English

HAROLD RICHARD EMERY, FIRST LIEUT., INF., U. S. A.
Instructor in Military Science and Tactics

MAURICE EWING, B.A., M.A.
Instructor in Physics

WARREN FLETCHER, A.B., M.A.
Instructor in English

WILLIAM HARRY FORMHALS, B.S. IN E.E.
Instructor in Electrical Engineering

DANIEL H. HARRIS, A.B., M.A.
Instructor in Psychology

JUSTUS MITCHELL HOLME, B.S. IN C.E.
Instructor in Civil Engineering

HENRY CARL IVAR KNUTSON, E.E.
Instructor in Electrical Engineering

THEODORE THOMAS LAFFERTY, A.B., M.A., PH.D.
Instructor in Philosophy and Psychology

WILSON FRELS PAYNE, PH.B., M.A.
Instructor in Economics

LAWRENCE WHITCOMB, PH.B., A.M., PH.D.
Instructor in Geology

WILLIAM WALDO WILLIAMS, B.S., M.S.
Instructor in Chemistry

ASSISTANTS

THOMAS JOSEPH LAVIN, STAFF SERGT., D.E.M.L., U. S. A.

Assistant in Military Science and Tactics

FRED JOHN MOHRING, TECH. SERGT., D.E.M.L., U. S. A.

Assistant in Military Science and Tactics

JAMES MAHONEY

Assistant in Swimming

HUGH SMILEY STANLEY, A.B., A.M.

Assistant in Mathematics

FRANCIS JOHN TREMBLEY, B.S.

Assistant in Biology

GEORGE FRANCIS GASDA, SERGT., D.E.M.L., U. S. A.

Assistant in Military Science and Tactics

ELMER RAYMOND BINKLEY, B.S.

Graduate Assistant in Physics

GEORGE WELLINGTON HARTZELL, B.A.

Graduate Assistant in German

CARES CREIGHTON KEYSER, C.E.

Laboratory Assistant in Civil Engineering

ROBERT KREADY MOWRER, B.S.

Graduate Assistant in Physics

LEHMAN CHARLES SHUGART, A.B.

Assistant in Physics

ALVIN JACOB FRANTZ, B.S. IN CHEM.

Graduate Assistant in Chemistry

WILLIAM SCHUYLER MILLER, B.S. IN CHEM.

Graduate Assistant in Chemistry

J. LELAND MYER, B.S.

Graduate Assistant in Physics

HENRY GEORGE SWAIN, A.B.

Graduate Assistant in Mathematics

WALTER PENNYPACKER WILLS, B.S. IN E.E.

Graduate Assistant in Electrical Engineering

RESEARCH FELLOWS

GEORGE FRANCIS BEAL, B.S. IN CH.E.
New Jersey Zinc Company Research Fellow

FOREST THEODORE BENTON, JR., CH.E.
Barrett and Company Leather Research Fellow

WALLER HOWARD HOBACK, A.B.
*Archer-Daniels-Midland Company and William O. Goodrich
Company Research Fellow*

PHILIP KRATZ, CH.E.
Hunt-Rankin Leather Company Research Fellow

WILLIAM S. WRIGHT McCARTER, B.S. IN CH.E.
*Archer-Daniels-Midland Company and William O. Goodrich
Company Research Fellow*

EDWARD WEST MIDLAM, JR., CH.E.
*Archer-Daniels-Midland Company and William O. Goodrich
Company Research Fellow*

GORDON WESLEY PARKINSON, B.Sc.
Lehigh Institute of Research Fellow in Civil Engineering

ALFRED EDWARD RHEINECK, B.S. IN CH.E.
*Archer-Daniels-Midland Company and William O. Goodrich
Company Research Fellow*

OSCAR BERNHARDT SCHIER, M.E.
*James Ward Packard Research Fellow in Mechanical
Engineering*

LEONARD MUHLENBERG BENNETT, B.S. IN CH.E.
H. M. Byllesby Research Fellow in Engineering

WALTER JOHANN BRAND, A.B.
*Archer-Daniels-Midland Company and William O. Goodrich
Company Research Fellow*

BENNETT FRANK BUIE, B.S.
Lehigh Institute of Research Fellow in Geology

KENNETH GROVES CHESLEY, A.B.
Lehigh Institute of Research Fellow in Chemistry

ARTHUR WILLIAM GOETZ, CH.E.

Hunt-Rankin Leather Company Research Fellow

SELMA FLORA HERMANN, B.S. IN CHEM.

Engineering Foundation Research Fellow

CARL LESTER KREIDLER, B.S. IN C.E.

Lehigh Institute of Research Fellow in Civil Engineering

ALFRED NATHAN ROGERS, B.S. IN CH.E.

Student Chemistry Foundation Fellow

ARTHUR LEVERN SMITH, B.S. IN CH.E.

Student Chemistry Foundation Fellow

FORREST JEROME WHITNEY, JR., E.E.

Engineering Foundation Research Fellow

COMMITTEES OF THE FACULTY

(The term of each member expires in June of the year given in parenthesis after his name. The President is ex officio a member of all committees)

ADMISSIONS: Dean McConn (*ex officio*), Registrar Curtis (*ex officio*), Professors Anderson (1931), S. M. Brown (1932), S. A. Becker (1933), Fox (1934), More (1935), Drown (1936), Smail (1937).

ADVANCED STANDING: Registrar Curtis (*ex officio*), Professors Bidwell (1931), Fort (1932), Bradford (1933), Babasinian (1934).

ATHLETICS (FACULTY MEMBERS OF THE BOARD OF CONTROL OF ATHLETICS): Professors Reiter (*ex officio*), Beaver* (1931), Long (1932), Carothers (1933).

CHAPEL: Professors Babasinian (1931), Butts (1932), Klein (1933), Reynolds (1934), Hall (1935).

DISCIPLINE: Dean McConn (*ex officio*), Professors Petersen (1931), Thomas† (1932), More (1933).

EDUCATIONAL POLICY: Professor F. V. Larkin (1931), Vice-President Emery (1932), Professors Eckfeldt (1933), Carothers (1934), Palmer (1935).

* Absent on leave, Dr. Bull serving.

† Absent on leave first semester, Professor Stuart serving.

FACULTY EDUCATIONAL CLUB: Vice-President Emery, Professors Fort, Reynolds, Anderson, Petersen, F. C. Becker.

Pres. Richard
Ullmann
HONORARY DEGREES: ~~Professor Ogburn~~ (1931), Librarian Leach (1932), Professors Gipson (1933), B. L. Miller (1934), Slater (1935), Vice-President Emery (1936). *S. C. ...*

HOUSE COMMITTEE, DROWN MEMORIAL HALL: Professor Fretz (1931), and two student members: Messrs. J. M. Lyons and G. J. Schaumburg.

INSPECTION TRIPS: Professors Payrow (1931), Wilson (1932), Stuart (1933), Anderson (1934), Hibshman (1935).

LIBRARY: Librarian Leach (*ex officio*), Professors Hall (1931), Gipson (1932), Diamond (1933), Bidwell (1934). *m...*

PETITIONS: Dean McConn (*ex officio*), Registrar Curtis (*ex officio*), Professors Hibshman (1931), Jensen (1932), Bishop (1933).

PUBLICATIONS, BOARD OF: Dean McConn (*ex officio*), Professors Luch (1931), Riley (1932), and three student members: Messrs. A. W. Thornton, R. S. Chess, and C. A. Harding.

ROSTER: Registrar Curtis (*ex officio*), Professors Beaver* (1931), Uhler (1932), Neville (1933), Cowin (1934).

STANDING OF STUDENTS: Dean McConn, Registrar Curtis, Professors Palmer, Carothers, Ullmann, Sutherland, Seyfert, Bidwell, Larkin, Stoughton, Eckfeldt (all members *ex officio*).

STUDENT ACTIVITIES: Dean McConn (*ex officio*), Professors Beck (1931), Seyfert (1932), and three student members: Messrs. R. L. Baird, W. M. Mayberry, and R. M. Powers.

STUDENT CLUBS: Dean McConn (*ex officio*), Dr. Bull (1931), Professor Toohy (1932), and three student members: Messrs. W. C. MacDougall, J. G. Meharg, and A. W. Thornton.

SUMMER SESSION: Vice-President Emery (*ex officio*), Professors Drown (1931), Hughes (1932), Reynolds (1933), Smith (1934), Fuller (1935).

* Absent on leave, Professor Harmon serving.

OFFICERS OF ADMINISTRATION

Office of the President

CHARLES RUSS RICHARDS, M.M.E., ENG.D., LL.D., *President*

Office of the Vice-President and Comptroller

NATT MORRILL EMERY, A.B., M.A., LITT.D., *Vice-President and Comptroller*

FREDERICK RALPH ASHBAUGH, *Bursar and Purchasing Agent*

MELVIN SCHISLER, C.P.A., *Bookkeeper*

ENGLEBERT HENRY BADERSCHNEIDER, M.E., *Manager of Supply Bureau*

Office of the Dean

CHARLES MAXWELL MCCONN, B.A., M.A., LITT.D., *Dean*

GEORGE BARTLETT CURTIS, B.A., A.M., *Associate Dean*

Office of the Registrar

GEORGE BARTLETT CURTIS, B.A., A.M., *Registrar*

PAUL ENGLEBERT SCHWARTZ, B.S., *Assistant Registrar*

JEANETTE CLEVELAND, *Recorder*

Directors of Curricula

PHILIP MASON PALMER, A.B., *Director of the College of Arts and Science*

NEIL CAROTHEES, B.A., PH.D., *Director of the College of Business Administration*

HARRY M. ULLMANN, A.B. PH.D., *Director of the Curricula in Chemistry and Chemical Engineering*

HALE SUTHERLAND, A.B., S.B., *Director of the Curriculum in Civil Engineering*

STANLEY SYLVESTER SEYFERT, E.E., M.S., *Acting Director of the Curriculum in Electrical Engineering*

CHARLES CLARENCE BIDWELL, A.B., PH.D., *Director of the Curriculum in Engineering Physics*

FRED VIALI LARKIN, B.S., M.E., *Director of the Curricula in Mechanical Engineering and Industrial Engineering*

BRADLEY STOUGHTON, PH.B., B.S., *Director of the Curriculum in Metallurgical Engineering*

HOWARD ECKFELDT, B.S., E.M., *Director of the Curriculum in Mining Engineering*

Summer Session

NATT MORRILL EMERY, A.B., M.A., LITT.D., *Director*

Faculty

GEORGE BARTLETT CURTIS, B.A., A.M., *Secretary*

Legal Counsel

ROBERT SAYRE TAYLOR, B.S., *Legal Counsel*

Linderman Memorial Library

HOWARD SEAVOY LEACH, A.B., M.A., *Librarian*

CORA KNUTSFORD DUNNELLS, *Cataloguer*

ELIZABETH BAER HAY, A.B., B.S. IN L.S., *Circulation Desk Attendant*

MARGARET LARAMY MEAKER, B.A., B.S. IN L.S., *First Assistant Cataloguer*

ISABEL ARDEY BOONE, A.B., B.S. IN L.S., *Assistant Cataloguer*

ROBERT F. RILEY, *Clerk*

Packer Memorial Church

THE VERY REV. DANIEL WILMOT GATESON, B.A., M.A., *Chaplain*

THOMAS EDGAR SHIELDS, A.A.G.O., *Organist*

Bureau of Student Employment and Housing

DAVID BRAUN, A.B., B.D., *Secretary*

Students' Health Service

RAYMOND COOLEY BULL, B.S., A.B., M.D., *Director*

JOSEPH ROOSEVELT BIERMAN, B.S., M.D., *Assistant Director*

MES. JENNIE VYE DACEY, R.N., *Nurse in charge of Dispensary*

HARRY FREDERICK HOFFMAN, M.D., *Consultant in Mental Hygiene*

WILLIAM MICHAEL BURKHARDT, *Masseur*

Board of Control of Athletics

JOHN GRAFIUS PETRIKIN, B.S., *Graduate Manager of Athletics*

University Band

THOMAS EDGAR SHIELDS, A.A.G.O., *Director*

Lehigh Union

DAVID BRAUN, A.B., B.D., *Secretary*

Promotion and Publicity

ANDREW EDWARD BUCHANAN, JR., CH.E., *Director*

Office of Superintendent of Buildings and Grounds

ANDREW WILLARD LITZENBERGER, *Superintendent of Buildings and Grounds*

JOHN DAVID HARTIGAN, *Superintendent of the Power Plant*

Standing Committees

ART EXHIBITIONS: Professors Palmer, Howland, Librarian Leach, Vice-President Emery.

GRADUATE BOARD: President Richards (*ex officio*), Dean McConn (*ex officio*), Professors Thomas, Carothers, Smith, Larkin, Miller, More (*Executive Secretary*), Gipson, Hughes, Seyfert, Fort, Bidwell.

INSTITUTE OF RESEARCH: President Richards (*ex officio*), Professors Ullmann, Sutherland, Seyfert, Larkin, Stoughton, Eckfeldt, Bidwell, Miller, Hall, Carothers, Gipson.

LECTURES: Registrar Curtis (1931), Professors Howland (1931), Diamond (1932), Schulz (1932), S. M. Brown (1933), Stuart (1933).

MENTAL HYGIENE: Professor Hughes, Dean McConn, Dr. Bull, Dr. Hoffman.

REGISTER: Vice-President Emery, Registrar Curtis, Professors Smith, Cowin, Wilson.

SCHOLARSHIPS AND LOANS: Vice-President Emery, Dean McConn, Treasurer Okeson.

TEACHER PLACEMENT: Professor Hughes, Dean McConn, Professors Drown (*Secretary*), Palmer, Carothers, Uilmann.

WILLIAMS SENIOR PRIZE: Professors Smith, Palmer, Hughes, Carothers.

REQUIREMENTS FOR ADMISSION

Candidates for admission to Lehigh University must be at least sixteen years of age, must present testimonials of good moral character, and must be qualified in fifteen entrance units as enumerated below. The University reserves the right to require any candidate for admission to present himself for a personal interview and to select candidates otherwise qualified on the basis of such an interview. Women are not admitted to the work of the first semester or of the second semester either as undergraduate students or as special students. No registration is accepted later than the tenth day of instruction.

All students entering the University are required to present a certificate of vaccination against small-pox within three years of the time of entering the University. They must also have a scar as evidence of previous successful vaccination. Students who cannot comply with this regulation will be vaccinated by the Director of the Health Service, and in case the vaccination is unsuccessful will be re-vaccinated.

THE COLLEGE OF ARTS AND SCIENCE

Candidates for admission to the College of Arts and Science must present credit in the following units:

	Units*
English,	3
Latin or German or French or Spanish,	2
History,	1
Elementary Algebra,	1
Intermediate Algebra,	$\frac{1}{2}$
Plane Geometry,	1
Elective subjects,	$6\frac{1}{2}$
	<hr/>
	15

* A unit represents a year's study in a single subject in a secondary school, comprising the work of 180 recitation periods (5 periods a week for 36 weeks) of forty minutes each or the equivalent.

THE COLLEGE OF BUSINESS ADMINISTRATION

Candidates for admission to the College of Business Administration must present credit in the following units:

	Units*
English,	3
Latin or German or French or Spanish,	2
History,	1
Elementary Algebra,	1
Intermediate Algebra,	$\frac{1}{2}$
Plane Geometry,	1
Elective subjects,	$6\frac{1}{2}$
	<hr/>
	15

THE COLLEGE OF ENGINEERING

Candidates for admission to the College of Engineering must present credit in the following units:

	Units*
English,	3
Latin or German or French or Spanish,	2
History,	1
Elementary Algebra,	1
Intermediate Algebra,	$\frac{1}{2}$
Plane Geometry,	1
Solid Geometry,	$\frac{1}{2}$
Plane Trigonometry and Logarithms,	$\frac{1}{2}$
Elective subjects	$5\frac{1}{2}$
	<hr/>
	15

ELECTIVE SUBJECTS

	Units*
English, fourth year,	1
Intermediate Algebra, second term,	$\frac{1}{2}$
Advanced Algebra,	$\frac{1}{2}$
Solid Geometry,	$\frac{1}{2}$
Plane Trigonometry and Logarithms,	$\frac{1}{2}$
Greek,	1, 2, or 3
Latin,	1, 2, 3, or 4
French,	1, 2, 3, or 4
German,	1, 2, 3, or 4
Spanish,	1, 2, 3, or 4

* A unit represents a year's study in a single subject in a secondary school, comprising the work of 180 recitation periods (5 periods a week for 36 weeks) of forty minutes each or the equivalent.

American History,	1
Ancient History,	$\frac{1}{2}$ or 1
Mediaeval and Modern History,	1
English History,	$\frac{1}{2}$ or 1
Civics,	$\frac{1}{2}$, 1, or $1\frac{1}{2}$
Economics,	$\frac{1}{2}$ or 1
General Science,	1
Physics,	1 or 2
Chemistry,	1 or 2
Biology,	$\frac{1}{2}$, 1 or 2
Botany,	$\frac{1}{2}$ or 1
Zoology,	$\frac{1}{2}$ or 1
Physiography,	$\frac{1}{2}$ or 1
Industrial History,	$\frac{1}{2}$ or 1
Business Law,	$\frac{1}{2}$ or 1
Commercial Geography,	$\frac{1}{2}$ or 1

Applicants may also elect not more than two units from the following supplementary list:

Physiology and Hygiene,	$\frac{1}{2}$ or 1
Manual Training,	$\frac{1}{2}$ or 1
Freehand Drawing,	$\frac{1}{2}$
Mechanical Drawing,	$\frac{1}{2}$
Bookkeeping, Stenography and Typewriting,	1 or 2

Other subjects from the curriculum of a high school of the first class may be credited up to a total of one unit.

ADMISSION BY CERTIFICATE

Lehigh University has no permanent arrangement with any school whereby certificates are accepted in lieu of entrance examinations; but certificates are ordinarily accepted from first-class high schools in Pennsylvania, and from schools accredited by the Association of Colleges and Secondary Schools of the Middle States and Maryland, the New England College Entrance Certificate Board, the Regents of the University of the State of New York, the North Central Association of Colleges and Secondary Schools, the Association of Colleges and Secondary Schools of the Southern States, and the state universities of those states having such institutions.

Upon completion of his course an applicant for admission by certificate should request his school principal to send to the Registrar a complete record of his work. Blanks for this purpose will be supplied by the University.

Each candidate for admission must present full school and college records from each institution previously attended; failure to present such records will result in cancellation of registration.

ADMISSION BY EXAMINATION

Examinations at the University

Examinations for admission to the University will be held in 1931 as follows:

Algebra, Elementary	June 11, Sept. 11,	8:30 a.m.
Algebra, Intermediate	June 11, Sept. 11,	10:30 a.m.
Algebra, Advanced	June 11, Sept. 11,	2:00 p.m.
Biology	June 13, Sept. 14,	2:00 p.m.
Botany	June 13, Sept. 14,	2:00 p.m.
Business Law	June 11, Sept. 11,	2:00 p.m.
Chemistry	June 12, Sept. 12,	8:30 a.m.
Civics	June 11, Sept. 11,	2:00 p.m.
Commercial Geography	June 10, Sept. 10,	2:00 p.m.
Economics	June 11, Sept. 11,	2:00 p.m.
English	June 13, Sept. 14,	8:30 a.m.
Freehand Drawing	June 13, Sept. 14,	2:00 p.m.
French	June 12, Sept. 12,	2:00 p.m.
General Science	June 13, Sept. 14,	2:00 p.m.
Geometry, Plane	June 10, Sept. 10,	8:30 a.m.
Geometry, Solid	June 10, Sept. 10,	10:30 a.m.
German	June 12, Sept. 12,	2:00 p.m.
Greek	June 12, Sept. 12,	2:00 p.m.
History		
American	June 11, Sept. 11,	2:00 p.m.
Ancient	June 10, Sept. 10,	8:30 a.m.
English	June 11, Sept. 11,	8:30 a.m.
Mediaeval and Modern.....	June 10, Sept. 10,	2:00 p.m.
Industrial History	June 10, Sept. 10,	2:00 p.m.
Latin	June 12, Sept. 12,	8:30 a.m.
Mechanical Drawing	June 13, Sept. 14,	2:00 p.m.
Physics	June 12, Sept. 12,	8:30 a.m.
Physiography	June 13, Sept. 14,	2:00 p.m.
Physiology	June 13, Sept. 14,	2:00 p.m.
Problems of Democracy.....	June 10, Sept. 10,	2:00 p.m.
Spanish	June 12, Sept. 12,	8:30 a.m.
Trigonometry	June 11, Sept. 11,	2:00 p.m.
Zoology	June 13, Sept. 14,	2:00 p.m.

Examinations in other subjects presented for elective units may be arranged by correspondence with the Registrar.

Candidates for admission who wish to take examinations for advanced credit in any subjects should notify the Registrar before September 1.

Examinations at Schools

Upon the request of school principals the June entrance examinations may be held at schools on the regularly scheduled dates. Requests for examination papers should be sent to the Registrar before June 1.

College Board Examinations

Certificates of the College Entrance Examination Board are accepted in subjects in which the recorded grade is 60 per cent or higher.

The examinations of the College Entrance Examination Board are held in June of each year. Information in regard to these examinations, application blanks, and a circular giving detailed definitions of requirements in all examinations may be obtained from the College Entrance Examination Board, 431 West 117th Street, New York, N.Y.

ADMISSION TO ADVANCED STANDING

A student who desires to transfer to Lehigh University from another college or university must submit an official transcript of his record in the other institution; this certificate should include his college credits, a list of the entrance credits accepted for admission to that other institution, and a statement of honorable dismissal.

A candidate for admission to Lehigh University with advanced standing must meet the entrance requirements prescribed for undergraduates. In the event that the entrance credits presented for admission to the former institution do not meet the entrance requirements of Lehigh University in full, subjects which have been taken in college may be presented to make up the deficiencies. No student is admitted to Lehigh University who is not eligible to continue in good scholastic standing at the institution from which he is transferring.

A candidate who has attended more than one college or university must present a record from each institution; failure to submit a complete record of former academic experience will result in cancellation of registration.

Graduates of other colleges are admitted to Lehigh University without examinations. The length of time for the completion of a curriculum will depend upon the student's attainments at entrance and upon his ability.

A student who intends to take an engineering curriculum at Lehigh University after graduation from college should so arrange his work in college as to cover as many as possible of the subjects of the freshman and sophomore years of the engineering curriculum he selects.

ADMISSION OF SPECIAL STUDENTS

Applicants for special schedules may be accepted as special students on recommendation of the head of the curriculum in which the student proposes to do his special work, and upon approval of the Dean. Candidates must be at least twenty-one years of age and must present evidence of ability to pursue with profit the subjects that they wish to study at the University.

ADMISSION TO GRADUATE COURSES

A student who has taken the bachelor's degree or a degree in technology at any recognized college, university, or technical institution may be admitted as a graduate student and by permission of the Graduate Board may pursue studies leading to the degree of Master of Arts or Master of Science under the following regulations:

1. All work which is to be credited toward a master's degree shall be done in actual and regular attendance at the University.

2. A minimum of thirty semester hours is required for the master's degree.

3. Each graduate student must submit for approval of the Graduate Board the program of courses he proposes to take to satisfy the requirements for the Master's degree.

4. At least eighteen of the required thirty semester hours must be taken in one department. The remaining twelve hours will ordinarily be taken in one or two other departments; but, with the approval of the Graduate Board, the entire thirty

hours may be taken in a single department. In all cases, however, the work must be taken under at least two instructors, and the distribution of the work shall be made upon the advice and with the approval of the head of the major department.

5. At least twelve of the eighteen semester hours required in the major department and at least fifteen of the thirty semester hours required for the degree must be taken in courses open primarily to graduates.

6. A thesis may be required by the major department. If required, the thesis shall not count for more than six semester hours. Two bound typewritten copies of the thesis (one of which shall be an original copy), approved by the head of the major department, shall be placed in the hands of the Secretary of the Graduate Board at least two weeks before the day on which the degree is to be conferred. The form of the thesis must conform to the specifications that have been established by the Graduate Board. Full information concerning these specifications may be obtained from the Librarian of the University or from the Secretary of the Graduate Board.

7. The Master's degree will not be granted unless the candidate has earned the grade A or B in at least three-fifths of his work. No course in which the grade earned is less than C will count toward the degree.

8. Candidates employed as full-time teachers in the University or elsewhere may not take more than six hours of graduate work in any one semester.

9. Tuition for graduate work is at the rate of \$10.00 per semester hour.

10. The registration day for graduate students each semester is the Saturday following the registration days for undergraduates. All graduate registration must be completed within three weeks of that date.

11. Women are admitted as graduate students on the same terms as men except that registration in courses open to undergraduates is subject to the special approval of the head of the department concerned.

When all requirements have been met, the candidate will be recommended by the Faculty to the Trustees for the Master's degree appropriate to the work pursued.

ENTRANCE REQUIREMENTS IN DETAIL

ENGLISH

Preparation in English has three main objects: (1) command of correct and clear English, spoken and written; (2) ability to use the vernacular with accuracy and appreciation; and (3) some acquaintance with the simpler English classics.

ENGLISH GRAMMAR AND COMPOSITION. The first two objects require instruction in grammar and composition. English grammar should be reviewed in the secondary school, and correct spelling and grammatical accuracy should be rigorously exacted in connection with all written work during the four years. The principles of English composition governing punctuation, the use of words, paragraphs, and the different kinds of composition, including letter-writing, should be thoroughly mastered; and practice in composition, oral as well as written, should extend throughout the secondary school period. Written exercises may well comprise narration, description, and easy exposition based upon the principles of elementary rhetoric, as given in any approved high school rhetoric. It is advisable that subjects for this work be taken from the student's personal experience, general knowledge, and studies other than English, as well as from his reading in literature.

LITERATURE. The third object is sought by means of two lists of books, headed respectively reading and study, from which may be framed a progressive course in literature covering four years. In connection with both lists, the student should be trained in reading aloud and be encouraged to commit to memory some of the more notable passages both in verse and in prose. The books for reading and study are to be selected from the group suggested by the Conference on Uniform Entrance Requirements in English. 3 or 4 units

HISTORY

The requirement in history is based on the recommendation of the Committee of Seven of the American Historical Association.

ANCIENT HISTORY, with special reference to Greek and Roman History, including also a short introductory study of the more ancient nations, and the chief events of the early Middle Ages down to the death of Charlemagne (814). 1 unit

MEDIAEVAL AND MODERN HISTORY, from the death of Charlemagne to the present time. 1 unit

ENGLISH HISTORY, with due reference to social and political development. 1 unit

AMERICAN HISTORY AND CIVIL GOVERNMENT, with due reference to social and political development. 1 unit

The examinations in history will be so framed as to require comparison and the use of judgment on the pupil's part rather than the mere use of memory. The examinations will presuppose the use of good text-books, collateral reading, and practice in written work. Geographical knowledge will be tested by requiring the location of places and movements on an outline map.

MATHEMATICS

ELEMENTARY ALGEBRA (ALGEBRA TO QUADRATIC EQUATIONS). The four fundamental operations for rational algebraic expressions; factoring, determination of highest common factor and lowest common multiple by factoring; fractions, including complex fractions, and ratio and proportion; linear equations, both numerical and literal, containing one or more unknown numbers; problems depending on linear equations; radicals, including the extraction of the square root of polynomials and of numbers; exponents, including the fractional and negative.

1 unit

INTERMEDIATE ALGEBRA (QUADRATIC EQUATIONS AND BEYOND). Quadratic equations, both numerical and literal; simple cases of equations with one or more unknown numbers that can be solved by the methods of linear or quadratic equations; problems depending on quadratic equations; the binomial theorem for positive integral exponents; the formulas for the n th term and the sum of the terms of arithmetic and geometric progressions with applications.

$\frac{1}{2}$ unit

ADVANCED ALGEBRA. Permutations and combinations, limited to simple cases; complex numbers, with graphical representation of sums and differences; determinants, chiefly of the second, third, and fourth orders, including the use of minors and the solution of linear equations; numerical equations of higher degree, and as much of the theory of equations, with graphical methods, as is necessary for their treatment, including Descartes' rule of sign and Horner's method, but not Sturm's functions or multiple roots.

$\frac{1}{2}$ unit

PLANE GEOMETRY. The usual theorems and constructions of good text-books, including the general properties of plane rectilinear figures; the circle and the measurement of angles; similar polygons; areas; regular polygons; and the measurement of the circle. The solution of numerous original exercises, including locus problems; applications to the measurement of lines and of plane surfaces.

1 unit

SOLID GEOMETRY. The usual theorems and constructions of good text-books, including the relations of planes and lines in space; the properties and measurements of prisms, pyramids, cylinders, and cones; the sphere and the spherical triangle.

The solution of numerous original exercises, including locus problems; applications to the mensuration of surfaces and solids. $\frac{1}{2}$ unit

PLANE TRIGONOMETRY. Definitions and relations of the six trigonometric functions as ratios; circular measurements of angles; proofs of principal formulas, in particular for the sine, cosine, and tangent of the sum and the difference of two angles, of the double angle, and the half angle, the product expressions for the sum or the difference of two sines or of two cosines, etc.; the transformation of trigonometric expressions by means of these formulas; solution of trigonometric equations of a simple character; theory and use of logarithms (without the introduction of work involving infinite series); the solution of right and oblique triangles and practical applications. Candidates must bring their logarithmic tables to the examination. $\frac{1}{2}$ unit

Candidates must have a knowledge of the metric system and be prepared to solve problems in either algebra or geometry involving the use of the metric system.

The entrance requirements in Solid Geometry and Plane Trigonometry are included in Math. 1 and Math. 16 offered during the Summer Session.

GREEK

GREEK. Grammar; elementary prose composition, consisting principally of detached sentences to test the candidate's knowledge of grammatical construction; Xenophon: the first four books of the *Anabasis*; the translation, at sight, of a passage from some work of Xenophon. 2 units

GREEK. Homer's *Iliad*, I-III: The first three books of the *Iliad* (omitting II, 494-end), and the Homeric forms, constructions, and prosody. 1 unit

LATIN

The requirements in Latin are in accord with those of the College Entrance Examination Board.

The Latin reading shall not be less in amount than four books of Cæsar, six orations of Cicero, and six books of Vergil's *Aeneid* for the second, third, and fourth years respectively. There are no prescribed readings, but the following recommendations are made:

(1) In the second year the early reading should be easy Latin which may be "made" or adapted Latin; not less than one semester of this year should be devoted to the reading of selections from Cæsar. The reading for this year may also include easy selections from such authors as Aulus Gellius, Eutropius, Nepos, Phaedrus, Quintus Curtius Rufus, and Valerius Maximus, or books of selections containing some of these together with other authors of prose works.

(2) In the third year, if the reading be in prose, not less than one semester should be devoted to the reading of selections from Cicero; the reading for the year may also include selections from such authors as Pliny, Sallust, and Livy, or books of selections containing these and other authors of prose works.

(3) In the fourth year, if the reading be in poetry, not less than one semester should be devoted to the reading of selections from Vergil; and the reading for the year may also include selections from such works as the *Metamorphoses*, *Tristia*, *Heroides*, and *Fasts* of Ovid, or books of selections containing poems or extracts from Ovid or from other poets.

The College Entrance Examination Board has prepared a word list which indicates a vocabulary that students are expected to have at the end of two years, three years, and four years of Latin study. The list will serve to reassure teachers that deviation from the beaten path is safe provided they take the required vocabulary as one of their guides in making their choice of selections from the works recommended above. This word list may be obtained from the College Entrance Examination Board, 431 West 117th Street, New York, N. Y.

GERMAN

ELEMENTARY GERMAN, A. This requirement follows, in the main, the recommendation of the Committee of Twelve of the Modern Language Association. It is expected that two whole years will be given to the work.

During the first year the work should comprise: (1) careful drill in pronunciation; (2) the memorizing and frequent repetition of easy colloquial sentences; (3) drill upon the rudiments of grammar, that is, upon the inflection of the articles, of such nouns as belong to the language of everyday life, of adjectives, pronouns, weak verbs, and the more usual strong verbs; also upon the use of the more common prepositions, the simpler use of the modal auxiliaries, and the elementary rules of syntax and word-order; (4) abundant easy exercises, designed not only to fix in mind the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; (5) reading of from 75 to 100 pages of graduated texts from a reader, with constant practice in translating into German easy variations upon sentences selected from the reading lesson (the teacher giving the English), and in the reproduction from memory of sentences previously read.

During the second year the work should comprise: (1) the reading of from 150 to 200 pages of literature in the form of easy stories and plays; (2) accompanying practice, as before, in the translation into German of easy variations upon the matter read and in the off-hand reproduction, sometimes orally

and sometimes in writing, of the substance of short and easy selected passages; (3) continued drill in the rudiments of the grammar, directed to the ends of enabling the pupil, first, to use his knowledge with facility in the formation of sentences, and, secondly, to state his knowledge correctly in the technical language of grammar.

2 units

INTERMEDIATE GERMAN, B. This work should comprise, in addition to the elementary course, the reading of about 400 pages of moderately difficult prose and poetry, with constant practice in giving, sometimes orally and sometimes in writing, paraphrases, abstracts, or reproductions from memory of selected portions of the matter read; also grammatical drill upon the less usual strong verbs, the use of articles, cases, auxiliaries of all kinds, tenses and modes (with special reference to the infinitive and subjunctive), and likewise upon word order and word formation.

1 unit

FRENCH

ELEMENTARY FRENCH, A. This requirement follows in the main the recommendation of the Committee of Twelve of the Modern Language Association. It is expected that two whole years will be given to the work.

During the first year the work should comprise: (1) careful drill in pronunciation; (2) the rudiments of grammar, including the inflection of the regular and the more common irregular verbs, the plural of nouns, the inflections of adjectives, participles, and pronouns; the use of personal pronouns, common adverbs, prepositions, and conjunctions; the order of words in the sentence and the elementary rules of syntax; (3) abundant easy exercises, designed not only to fix in the memory the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; (4) the reading of from 100 to 175 pages of standard texts with constant practice in translating into French easy variations upon the sentences read (the teacher giving the English), and in reproducing from memory sentences previously read; (5) writing French from dictation.

During the second year the work should comprise: (1) the reading of from 250 to 400 pages of easy modern prose in the form of stories, plays, or historical or biographical sketches; (2) constant practice, as in the previous year, in translating into French easy variations upon the texts read; (3) frequent abstracts, sometimes oral and sometimes written, of portions of the text already read; (4) writing French from dictation; (5) continued drill upon the rudiments of grammar, with constant application in the construction of sentences; (6) mastery of the forms and uses of pronouns and pronominal adjectives, of all but the rare irregular verb forms, and of the simpler uses of the conditional and subjunctive.

2 units

INTERMEDIATE FRENCH, B. This should comprise the reading of from 400 to 600 pages of French of ordinary difficulty, a portion to be in the dramatic form; constant practice in giving French paraphrases, abstracts, or reproductions from memory of selected portions of the matter read; the study of a grammar of moderate completeness; writing from dictation. 1 unit

SPANISH

ELEMENTARY SPANISH, A. Two years' preparation, covering the following ground:

During the first year: (1) drill in the correct production of Spanish sounds; (2) the rudiments of grammar, illustrated by abundant easy exercises; (3) the reading of about 150 pages of graduated text with constant translating into Spanish of easy variations of sentences read, the teacher giving the English; (4) aural drill: practice in translating into English Spanish words, clauses, and sentences heard but not seen, the teacher giving the Spanish.

During the second year: (1) reading of 250 to 400 pages of easy modern prose; (2) constant practice in translating into Spanish easy variations upon the text read; (3) aural practice and drill in pronunciation; (4) mastery of the forms and uses of pronouns, of the subjunctive mode, and of the forms of the radical changing verbs. 2 units

INTERMEDIATE SPANISH, B. The reading of not less than 500 additional pages of Spanish prose together with the translation of at least 40 pages of simple connected English prose into Spanish. 1 unit

PHYSICS

The course of instruction in physics should include:

(1) The study of some standard text-book, for the purpose of obtaining a connected view of the subject; (2) instruction by lecture table demonstrations, to be used mainly for illustration of the facts and phenomena of physics; (3) individual laboratory work consisting of at least thirty experiments designed to supplement the pupil's fund of concrete knowledge and chosen with a view to furnishing forceful illustration of fundamental principles and their practical application. 1 unit

CHEMISTRY

The requirement in chemistry is based on the report of the Committee on Chemistry of the Science Department of the National Education Association.

ELEMENTARY CHEMISTRY. It is recommended that the candidate's preparation in chemistry include: (1) individual laboratory work, comprising at least forty exercises; (2) instruction by lecture table demonstrations, to be used mainly as a basis for questioning upon the general principles involved in the pupil's laboratory investigations; (3) the study of at least one

standard text-book, to the end that the pupil may gain a comprehensive and connected view of the most important facts and laws of elementary chemistry. 1 unit

Students properly qualified will be examined in Elementary Chemistry during Freshman Week; those passing the examination will be privileged to omit Elementary Chemistry, Chem. 1 and 11, and will take instead Chem. 3 and 13 during the first semester.

BIOLOGY

BIOLOGY. A year's work in general biology. 1 unit

In order to be acceptable as a substitute for college biology, the course offered may not be botany, zoology, or physiology but must be a general course covering such topics as are enumerated in the description of Biology 1 in this Register. Whether the course offered is acceptable will be determined at the University.

ZOOLOGY

ZOOLOGY. The equivalent of Jordan, Kellogg, and Heath's *Animal Studies*, with laboratory work. $\frac{1}{2}$ or 1 unit

BOTANY

BOTANY. An amount equal to that contained in Bergen's *Foundations of Botany*, with laboratory work. $\frac{1}{2}$ or 1 unit

PHYSIOLOGY AND HYGIENE

PHYSIOLOGY AND HYGIENE. A course covering approximately what is given in such a text-book as Huxley and Youman's *Physiology and Hygiene*. $\frac{1}{2}$ or 1 unit

PHYSIOGRAPHY

PHYSIOGRAPHY. The study of a standard text-book in physical geography, that a knowledge may be gained of the essential principles and of well-selected facts illustrating those principles. Individual laboratory work, comprising at least forty exercises, with notebook, is recommended. $\frac{1}{2}$ or 1 unit

DRAWING

FREEHAND DRAWING. Sketching of simple geometrical figures, of objects, and from copy. At least twenty plates must be submitted. $\frac{1}{2}$ unit

MECHANICAL DRAWING. The use of instruments and the preparation of at least twenty plates, illustrating the elements of descriptive geometry or simple machine parts. $\frac{1}{2}$ unit

MANUAL TRAINING

MANUAL TRAINING. Shop work in wood or metal in schools giving courses in manual training. $\frac{1}{2}$ or 1 unit

BOOKKEEPING, TYPEWRITING, AND STENOGRAPHY

BOOKKEEPING, TYPEWRITING, AND STENOGRAPHY, covering a formal course of study in school. 1 or 2 units

TUITION AND OTHER FEES

Tuition, in all colleges of the University, per annum....	\$400.00
Health Service fee, per annum.....	12.00
Athletic fee, per annum.....	15.00
Library fee†	5.00
Student Activities fee.....	5.00

Total annual fees..... \$437.00

These fees are payable as follows:

FIRST SEMESTER

(Payable on the registration days in September)

Tuition fee	\$225.00
Athletic fee, in full.....	15.00
One-half of the annual Health Service fee.....	6.00
One-half of the annual Student Activities fee.....	2.50
One-half of the annual Library fee.....	2.50

Total fees, first semester..... \$251.00

SECOND SEMESTER*

(Payable on the registration days in February)

Tuition fee	\$175.00
One-half of the annual Health Service fee.....	6.00
One-half of the annual Student Activities fee.....	2.50
One-half of the annual Library fee.....	2.50

Total fees, second semester..... \$186.00

MATRICULATION AND GRADUATION FEES. New students pay, once only, on admission, a Matriculation Fee of \$5.00; students at graduation pay a Graduation Fee of \$10.00.

LABORATORY FEES AND DEPOSITS. There are also laboratory fees or deposits in laboratory courses to cover the cost of laboratory supplies used by the individual students and to pro-

* Students entering or re-entering in the second semester pay first semester fees, except that they pay only one-half the Athletic Fee, \$7.50.

† Not charged in the cases of students in the Summer Session, special students, or students registered for six semester hours or less.

vide for breakage of glassware and instruments; the amounts of these fees and deposits are given in the Description of Courses in connection with each laboratory course. A deposit of \$25.00 is made by each student taking courses in Military Science and Tactics; this deposit is refunded when the government property issued to the student is returned.

LATE REGISTRATION FEES. The penalty for late registration is \$1.00 a day, up to a maximum of \$5.00, for each day of delay beyond the registration days in taking out the registration ticket; and a registration not completed within five days after the date on the registration ticket is subject to a late registration fee of \$5.00 a day.

SUMMER SESSION TUITION. The tuition for courses taken in the Summer Session is at the rate of \$10.00 per credit hour.

SPECIAL EXAMINATION FEES. Special examinations, authorized by the Committee on Standing of Students, are subject to a fee of \$5.00 each. This regulation applies to the psychological examination required of new students, if taken at other than the scheduled date. Any student who fails to keep his appointment for his physical examination is charged a late examination fee at the rate of \$1.00 a day until he applies for and receives another appointment; if he fails to meet his second appointment or any succeeding appointments, he again becomes subject to the same fee at the same rate.

REFUNDS. A refund of one-half of the tuition and laboratory fees of the current semester, one-half of the athletic fee and of the student activities fee, and the unused balance of chemistry deposits, is made to students who formally withdraw from the University within four weeks after the beginning of the semester; a refund of three-fourths of the tuition and laboratory fees, one-half of the athletic fee and of the student activities fee, and the unused balance of chemistry deposits is made to students who formally withdraw within two weeks; a refund of the entire tuition and laboratory fees, the entire athletic fee and the student activities fee, and the unused balance of chemistry deposits is made to students who formally withdraw within one week. The matriculation fee, the health service fee, and the library fee are not refunded. If a student is obliged to withdraw through injury or other physical disability and is unable to return later in that semester, a pro-rata

credit is allowed toward the tuition of the corresponding semester a year later.

SPECIAL SCHEDULES. Tuition for special schedules of less than twelve hours in any semester is at the rate of \$12.50 per semester hour.

STUDENT ACTIVITIES FEE. The Student Activities fee is appropriated as follows: *Lehigh Brown and White*, \$1.75; *Lehigh Union*, \$0.75; *Arcadia*, \$0.50; *Class dues*, \$1.00; *Mustard and Cheese*, \$0.50; *Musical Clubs*, \$0.50.

GRADUATE STUDENTS TUITION. The tuition for graduate courses is at the rate of \$10.00 per credit hour. Graduate students pay the matriculation and library fees; they are given the option of paying or not paying the athletic and health service fees; if they pay these fees they obtain the corresponding benefits.

To be eligible for a degree from Lehigh University, a student not only must have completed all of the scholastic requirements for the degree, but must have paid all University fees and all bills for the rental of rooms in the dormitories, or for damage to University property or equipment, or for any other indebtedness to the University; this regulation, however, does not apply to any indebtedness for deferred tuition or for loans from trust funds administered by the University, which are protected by properly executed notes approved by the Comptroller.

EXPENSES

Necessary expenses for the collegiate year, clothing and traveling not included, are estimated at \$600.00 in addition to tuition.

The University dormitories accommodate 171 students. The charge for single rooms is \$50.00, \$65.00, or \$80.00 a year; suites of three or four rooms rent at \$100.00 or \$120.00 for each occupant. Applications for rooms in the University dormitories should be filed with the Bursar.

A cafeteria is located in Drown Memorial Hall. Numerous private householders in the city offer rooms and board at moderate prices; information concerning such rooms and board may be obtained from the Secretary of the Bureau of Student Employment and Housing.

Books, stationery, and drawing instruments may be purchased at the Supply Bureau in the Alumni Memorial Building.

THE COLLEGE OF ARTS AND SCIENCE

The curriculum of the College of Arts and Science is based upon the general principles of distribution and concentration. The object of the distribution requirements is to give the student an elementary knowledge of the fields of contemporary thought and to orient him in the world of man and nature. These requirements are coordinated so far as possible with the work of the preparatory schools, and the number and nature of the prescribed courses to be taken in college is dependent upon the subjects presented for entrance.

The number of elective courses depends on the individual's distribution requirements but the work is so arranged that at least one free elective is open to every freshman. Well prepared freshmen have greater freedom in the choice of electives. In the succeeding years the number of free electives increases, being limited solely by the demands of the major work and the number of courses allowed the student per semester. Electives in the freshman and sophomore years should be used as orientation courses, for the purpose of enabling the student to discover his major interests. In the last two years the selection of electives is determined entirely by the personal choice of the individual student. The concentration or major requirement enables the student to capitalize his interests and to acquire a thorough grounding in some particular field.

The minimum course of study comprises fifteen scholastic hours or periods weekly. Students of proved ability, however, are not limited to this minimum.

The degree of Bachelor of Arts is conferred upon graduates of the College of Arts and Science.

Requirements for Graduation

1. The completion of one hundred twenty credit hours of collegiate work, apportioned so as to cover the distribution and concentration requirements, in addition to Military Science and Tactics, Chapel, and Physical Education required of all students.

2. A comprehensive examination in the major field with a grade of not less than C.

Distribution Requirements

1. **ENGLISH.** Twelve semester hours. These will ordinarily be Engl. 1, 2, 4, and 5. Students who demonstrate satisfactory ability in written composition in their placement examinations may satisfy this English requirement by passing Engl. 4 and 5 or an equivalent.

2. **FOREIGN LANGUAGE.** A reading knowledge of Latin, Greek, French, or German and an elementary knowledge of a second of these languages are required of all students. The requirement takes into consideration work done in the preparatory schools and may be met in the following ways:

Reading knowledge. Students may satisfy this requirement by examination; otherwise, students who offer three or four years of Latin, French, Greek, or German at entrance will satisfy this requirement by passing Lat. 1, 2, Gk. 5, 6, Fr. 21, 22, or Ger. 9, 10, in course; those who offer only two years of Latin, Greek, French, or German will continue the language presented for two years. With the permission of the Director of the College such students may substitute one of the other three languages. Students who offer two years of two or more languages, Latin, Greek, French, or German, may choose from these the language they are to continue. Students who offer two or more years in Spanish only will take Latin, Greek, French, or German in college for two years in addition to the elementary requirement stated below.

Elementary knowledge. The elementary knowledge may be established by examination at entrance or later or by passing Lat. 31, 32, Gk. 1, 2, Fr. 1, 2, or Ger. 1, 2, or any higher course in these languages.

3. **BIOLOGY, CHEMISTRY, GEOLOGY, PHILOSOPHY, PHYSICS, AND PSYCHOLOGY.** Three semester hours each. If a student has received entrance credit for one year's work in any of these subjects, he may omit that subject from his requirement. This requirement may be met by taking specially designed introductory courses in these subjects. (See description of entrance Biology.)

4. **MATHEMATICS AND ASTRONOMY.** Including the preparatory mathematics each student must present for graduation Elementary Algebra, Intermediate Algebra, Plane Geometry, Plane Trigonometry, and either Advanced Algebra or Solid Geometry

or Astronomy. Unified Mathematics pursued in college may be substituted semester by semester for any of the last four subjects.

5. HISTORY. Nine semester hours. For each year of history for which a student receives entrance credit this distribution requirement is reduced three hours. Students who have had no course in ancient history at entrance are required to take at least three semester hours in ancient history in college.

6. ECONOMICS. Six semester hours in economics are required of all students who have not had at least one full year of economics in the preparatory school.

Distribution requirements except economics should be met during the freshman and sophomore years. The assignment of the courses covering the distribution requirement of the individual student is made by the Director of the College.

Concentration Requirements—Majors

During the second semester of the freshman year each student must select some sequence of studies as his major field. A major consists of at least twelve semester hours of advanced work in the field chosen. Including preliminary college work, the minimum number of hours constituting a major is twenty-four. Change of major will be permitted up to the end of the sophomore year. Majors must be approved by the professors concerned and the Director of the College.

The major work is designed to enable a student to master his chosen field so far as that is possible in the two years devoted to the subject. In all fields certain courses are prescribed but the mere passing of courses will not satisfy the major requirement. It is expected that the student will read widely in his subject and prepare himself largely through his own reading and his own independent work for his final comprehensive examinations. After a student has selected a major subject, the head of the department in which the major is selected becomes the official adviser of the student and guides him in his choice of electives. The Director of the College of Arts and Science may be consulted at any time concerning the major requirements. Details concerning the major requirements are to be found in the printed Major Pamphlet.

A comprehensive examination in the major subject is required of all students. This examination is given at the end of the senior year and may be oral or written or both. The comprehensive examinations are given under the direction of the head of the major department; at least two university teachers and, whenever possible, representatives of at least two departments take part in the examinations.

On the advice of the head of the department in which the major work is being done and with the consent of the Director of the College, a senior of unusual merit who wishes to concentrate in his chosen field may be allowed to substitute not more than six hours of unscheduled work per semester for six hours of elective work otherwise required for graduation.

Special Honors (Honors in Majors)

Special honors are awarded at the end of the senior year, on recommendation of the head of the department concerned and by vote of the Faculty, to students who have done advanced work of unusual merit in some chosen field. Candidates for special honors must indicate during the first semester of the junior year their intention to work for such honors. Awards are based on grades obtained in the subject chosen, the results in extra work assigned, and the general proficiency of the candidate as evidenced by either a final examination or a thesis, as the head of the department involved may direct.

Special Regulations for English

Students in the College of Arts and Science who persistently use poor English may be reported at any time to the Director of the College. He may require that they take additional English without credit toward graduation. Toward the end of the junior year each junior in the College of Arts and Science must report to the Department of English for an exercise in impromptu writing. Students found seriously deficient in this test are reported to the Director of the College, who may require that they take additional English without credit toward graduation.

Elective Studies

1. Courses open to freshmen as electives.

FIRST SEMESTER			FRESHMAN ELECTIVES		SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.		
Biol. 1	....Biology	3	Astr. 1	....Descriptive Astr.	3		
Bus. 1	....Ind. Evolution	3	Biol. 2	....Mamm. Anatomy	2		
Chem. 1	....Elem. Chemistry	2	Biol. 3	....Comp. Anatomy	3		
Chem. 3	....Inter. Chemistry	2	Biol. 6	....Botany	3		
Chem. 11	....Chemistry Lab.	2	Biol. 9	....Genetics	1		
Chem. 12	....Chemistry Lab.	1	Bus. 2	....Ind. Evolution	3		
Chem. 13	....Chemistry Lab.	2	Chem. 1	....Elem. Chemistry	2		
Chem. 14	....Chemistry Lab.	1	Chem. 8	....Stoichiometry	1		
Engl. 3a	....World Literature	3	Chem. 11	....Chemistry Lab.	2		
Engl. 4	....Drama	3	Chem. 20	....Qual. Analysis	3		
Engl. 10	....Public Speaking	3	Engl. 3b	....World Literature	3		
F.A. 5	....Freehand Draw.	3	Engl. 5	....Drama	3		
Fr. 1	....Elem. French	3	Engl. 11	....Public Speaking	3		
Fr. 11	....Inter. French	3	F.A. 6	....Freehand Draw.	3		
Fr. 21	....Adv. French	3	Fr. 1	....Elem. French	3		
Geol. 3, 6	....Intro. to Geology	3	Fr. 2	....Elem. French	3		
Ger. 1	....Elem. German	3	Fr. 12	....Inter. French	3		
Ger. 3	....Inter. German	3	Fr. 22	....Adv. French	3		
Ger. 9	....Adv. German	3	Geol. 4, 6	....Gen. Geology	3		
Gk. 1	....Elem. Greek	3	Geol. 8	....Historical Geol.	3		
Gk. 3	....Inter. Greek	3	Ger. 1	....Elem. German	3		
Gk. 5	....Adv. Greek	3	Ger. 2	....Elem. German	3		
Hist. 13	....U.S. History	3	Ger. 4	....Inter. German	3		
Hist. 25	....European History	3	Ger. 10	....Faust	3		
Ital. 1	....Elem. Italian	3	Gk. 2	....Elem. Greek	3		
Lat. 1a	....Pliny, Martial, Vergil	3	Gk. 4	....Inter. Greek	3		
Lat. 1b	....Vergil, Ovid	3	Gk. 6	....Adv. Greek	3		
Lat. 21	....Ancient History	3	Hist. 14	....U.S. History	3		
Lat. 31	....Elem. Latin	3	Hist. 26	....European History	3		
Lat. 33	....Inter. Latin	3	Ital. 2	....Elem. Italian	3		
Math. 1	....Plane Trig.	3	Lat. 2	....Horace	3		
Math. 1a	....Unified Math.	3	Lat. 22	....Ancient History	3		
Math. 16	....Solid Geometry	3	Lat. 32	....Cæsar	3		
Math. 2	....Algebra	3	Lat. 34	....Cicero	3		
Phil. 3	....Intro. Philosophy	3	Math. 1	....Plane Trig.	3		
Phil. 5	....Phil. of Religion	1	Math. 2	....Algebra	3		
Phil. 11	....Ethical Problems	1	Math. 2a	....Unified Math.	3		
Phys. 12	....Intro. to Physics	3	Math. 3	....Anal. Geometry	3		
Psych. 5	....Intro. to Psychol.	3	Math. 16	....Solid Geometry	3		
Psych. 19	....Psych. of Conduct	1	Phil. 3	....Intro. Philosophy	3		
Span. 1	....Elem. Spanish	3	Phil. 6	....Phil. of Religion	1		
Span. 11	....Inter. Spanish	3	Phil. 12	....Ethical Problems	1		
Span. 21	....Adv. Spanish	3	Phys. 13	....General Physics	3		
			Psych. 5	....Intro. to Psychol.	3		
			Psych. 20	....Psych. of Conduct	1		
			Span. 1	....Elem. Spanish	3		
			Span. 2	....Elem. Spanish	3		
			Span. 12	....Inter. Spanish	3		
			Span. 22	....Adv. Spanish	3		

2. Sophomores, juniors, and seniors may elect in general any courses for which they have the prerequisites. Elementary courses intended primarily for freshmen and sophomores may not be taken for graduation credit by juniors and seniors without the consent of the Director of the College and the student's major adviser.

Preparation for Engineering

If a student in the College of Arts and Science contemplates becoming a candidate for a degree in engineering after the completion of his B.A. curriculum, he should choose as electives in his third and fourth years such science studies as are contained in the first and second years of the engineering curriculum which he wishes afterwards to complete. By carefully selecting electives, with the advice and guidance of the director of his curriculum and the professor in charge of the engineering curriculum concerned, the graduate of the B.A. course may enter the engineering curriculum chosen as a junior in full standing, and obtain his engineering degree in two years of further study.

Preparation for Medicine

Students in the College of Arts and Science who are preparing to enter a medical school must meet the regular requirements for distribution and concentration. In the course of the four years they must elect the following courses prescribed by the college to meet the demands of the medical schools: Biol. 1, 2, 3, 4, 9, 54; Chem. 1, 6, 7, 8, 11, 20, 30, 41, 160, 161, 165, 166; Phys. 12, 13, 14, 15. Students preparing for medicine should major in Biology or Chemistry. The professor of Biology is the official adviser of students preparing for medicine.

Preparation for Teaching

Students who expect to teach upon graduation should consult with the Department of Education early in their college course. A license or certificate is required of every one who teaches in the public schools of Pennsylvania or of any other state. The approved certificate in Pennsylvania for college graduates is the College Provisional Certificate granted upon completion of eighteen semester hours of professional or pedagogical courses and a minimum of eighteen semester hours in each subject which the candidate expects to teach. With the completion of three years of successful teaching and additional preparation amounting to six semester hours the certificate is made permanent. These eighteen semester hours of professional studies are apportioned as follows:

Introduction to Teaching (3)	cf. Educ. 1
Educational Psychology (3)	cf. Psych. 2
Practice Teaching (6)	cf. Educ. 15 and 16
Elective studies (6)	Educ. 2, 7, 8, 10, 109, 111, 114, Phil. 111, and Psych. 103 and 113 are suitable, also special method courses.

The requirements for certification in other states are similar to those in Pennsylvania, with minor differences.

A student who is preparing to teach should major in the subject he prefers to teach or in Education. Special method courses may be taken in the several departments that deal with the subject matter of school instruction: language, science, etc. Practice teaching is done mainly in the Bethlehem High School; but observation, practice, and substitute teaching may be done in elementary schools in Bethlehem and elsewhere. The Department of Physical Education offers courses for students who anticipate coaching and supervision of physical education.

THE CURRICULUM IN ARTS AND SCIENCE

For Classes of 1931 and 1932

FIRST SEMESTER			JUNIOR YEAR		SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.		
Biol. 1	.....Biology	3	Geol. 4	.....Geology	2		
Psych. 1	.....Psychology	3	Geol. 6	.....Field Trips	1		
Fr. 11	.....French	3	Psych. 2 or 4	.....Psychology	3		
Ger. 3	.....or German		Fr. 12	.....French	3		
	Electives	6	Ger. 4	.....or German			
P.E. 5	.....Physical Ed.	—		Electives	6		
		15	P.E. 6	.....Physical Ed.	—		
					15		
FIRST SEMESTER			SENIOR YEAR		SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.		
Phil. 1	.....Philosophy	3	Phil. 2	.....Philosophy	3		
	Electives	12		Electives	12		
P.E. 7	.....Physical Ed.	—	P.E. 8	.....Physical Ed.	—		
		15			15		

THE COLLEGE OF BUSINESS ADMINISTRATION

The purpose of the College of Business Administration is to provide for students intending to enter business rather than the professions thorough training in the principles which underlie all business activity. With this end in view the College offers a four-year curriculum which covers the fundamental economic principles that control the operation of industrial and commercial enterprises, the general laws that determine economic progress, and the basic facts of accounting, finance, and statistics that are applicable to all business.

The College of Business Administration does not pretend to equip students for the management of enterprises or the holding of responsible business positions immediately after graduation. It makes no attempt to provide a substitute for the training and experience in the complex details of any particular business that can be gained only from actual contact with that business. The primary aim is to develop in the student an intelligent understanding of forces and principles, an ability to analyze industrial and commercial phenomena, and a habit of thought that will enable him in later life to cope with the problems which increasing executive responsibility will bring. Above all the curriculum is intended to give the student such familiarity with various types of business that he can intelligently choose the special branch in which he is most likely to succeed.

In accordance with this plan of training in fundamentals the curriculum in Business Administration is more rigidly outlined than the ordinary curriculum of this type, with less opportunity than is customary for a narrow specialization in a technical field. The student who is especially interested in some such type of work as accounting or finance or industrial administration is given an opportunity to specialize in that field, but the curriculum does not permit specialization at the expense of the work in the fundamentals of industrial history, economic development, and social problems. The freshman year is devoted to work of a general nature which

provides a scientific and literary background for the later work. In the sophomore year the student takes up the basic courses which are prerequisite to the advanced work in business practice. The junior and senior years are devoted chiefly to technical business courses, so arranged that the student must learn the fundamentals common to all business enterprise.

Graduates of this curriculum receive the degree of Bachelor of Science in Business Administration.

THE CURRICULUM IN BUSINESS ADMINISTRATION

FIRST SEMESTER			FRESHMAN YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Bus. 1	Ind. Evolution...	3	Bus. 2	Ind. Evolution...	3	Bus. 2	Ind. Evolution...	3
Engl. 1	English	3	Engl. 2	English	3	Engl. 2	English	3
Math. 1	Trigonometry	3	Math. 2	Algebra	3	Math. 2	Algebra	3
Math. 2	or Algebra	3	Math. 3	or Anal. Geom.	3	Math. 3	or Anal. Geom.	3
Fr. 1 or 11	French	3	Astr. 1	or Des. Astr.	3	Astr. 1	or Des. Astr.	3
Ger. 1 or 3	or German	3	Math. 16	or Sol. Geom.	3	Math. 16	or Sol. Geom.	3
Span. 1 or 11	or Spanish	3	Fr. 2 or 12	French	3	Fr. 2 or 12	French	3
Chem. 1 or 3	Chemistry	2	Ger. 2 or 4	or German	3	Ger. 2 or 4	or German	3
Chem. 12 or 14	& Chem. Lab. 1	3	Span. 2 or 12	or Spanish	3	Span. 2 or 12	or Spanish	3
Biol. 7	or Biology	3	Chem. 21	Qual. Anal.	2	Chem. 21	Qual. Anal.	2
Geol. 16	or Physiog.	3	Chem. 8	& Stoich.	1	Chem. 8	& Stoich.	1
Phys. 12	or Physics	3	Biol. 8	or Biology	3	Biol. 8	or Biology	3
Mil. 1	M. S. & T.	2	Geol. 17	or Physiog.	3	Geol. 17	or Physiog.	3
P.E. 1	Physical Ed.	—	Phys. 13	or Physics	3	Phys. 13	or Physics	3
Chap. 1	Chapel	—	Mil. 2	M. S. & T.	2	Mil. 2	M. S. & T.	2
Phil. 5	or Phil. Rel.	1	P.E. 2	Physical Ed.	—	P.E. 2	Physical Ed.	—
Phil. 11	or Eth. Probs. 1	—	Chap. 2	Chapel	—	Chap. 2	Chapel	—
Psych. 19	or Psych. Con. 1	—	Phil. 6	or Phil. Rel.	1	Phil. 6	or Phil. Rel.	1
Engl. 33	or Bibleas Lit. 1	—	Phil. 12	or Eth. Probs. 1	—	Phil. 12	or Eth. Probs. 1	—
			Psych. 20	or Psych. Con. 1	—	Psych. 20	or Psych. Con. 1	—
			Engl. 34	or Bibleas Lit. 1	—	Engl. 34	or Bibleas Lit. 1	—
17			17			17		

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Bus. 3	Economics	3	Bus. 4	Economics	3	Bus. 4	Economics	3
Bus. 11	Accounting	3	Bus. 12	Accounting	3	Bus. 12	Accounting	3
Hist. 13	U. S. History	3	Hist. 14	U. S. History	3	Hist. 14	U. S. History	3
Hist. 25	or Eurpn. Hist.	3	Hist. 26	or Eurpn. Hist.	3	Hist. 26	or Eurpn. Hist.	3
Hist. 27	or Eurpn. Exp.	3	Hist. 28	or Eurpn. Exp.	3	Hist. 28	or Eurpn. Exp.	3
Psych. 10	Psychology	3	Psych. 15	Ind. Psychology	3	Psych. 15	Ind. Psychology	3
Fr. 11 or 21	French	3	Fr. 12 or 22	French	3	Fr. 12 or 22	French	3
Ger. 3 or 9	or German	3	Ger. 4 or 10	or German	3	Ger. 4 or 10	or German	3
Span. 11 or 21	or Spanish	3	Span. 12 or 22	or Spanish	3	Span. 12 or 22	or Spanish	3
Engl. 4, 6, or 10	or English	3	Engl. 5, 7, or 11	or English	3	Engl. 5, 7, or 11	or English	3
Mil. 3	M. S. & T.	2	Mil. 4	M. S. & T.	2	Mil. 4	M. S. & T.	2
P.E. 3	Physical Ed.	—	P.E. 4	Physical Ed.	—	P.E. 4	Physical Ed.	—
*Chap. 3	Chapel	—	*Chap. 4	Chapel	—	*Chap. 4	Chapel	—
17			17			17		

* Taken by students who elect Chap. 1 and 2 during freshman year.

FIRST SEMESTER		JUNIOR YEAR		SECOND SEMESTER			
Bus. 21	.....Corp. Finance ...	3		Bus. 22	.....Corp. Finance ...	3	
Bus. 29	.....Money & Banking	3		Bus. 30	.....Money & Banking	3	
Bus. 45	.....Statistics	3		Bus. 46	.....Business Cycles ..	3	
Bus. 15	.....Cest Accounting }			Bus. 16	.....Accounting Sys. }		
Bus. 49	..... or Econ.Geog. }	3		Bus. 50	..... or Econ.Geog. }	3	
Math. 41	..... or Math.of Fin. }			Math. 42	..... or Math.of Stat. }		
Govt. 51	.....American Govt. }			Govt. 52	.....American Govt. }		
Govt. 157	... or Mun. Man. }	3		Govt. 158	... or Mun. Man. }	3	
	Elective	3			Elective	3	
P.E. 5	.....Physical Ed. ...	—		P.E. 6	.....Physical Ed. ...	—	
		18				18	

FIRST SEMESTER	SENIOR YEAR	SECOND SEMESTER
Any five of the following courses :	Any five of the following courses :	
Bus. 33 .....Labor Problems. }	Bus. 34 .....Labor Problems. }	
Bus. 35 .....Public Utilities. }	Bus. 36 .....Public Utilities. }	
Bus. 57 .....Marketing	Bus. 56 .....Business Law ..	
Bus. 107 ....Adv. Economics	Bus. 58 .....Adv. & Selling..	
Bus. 113 ....Adv. Accounting }	Bus. 108 ....Adv. Economics }	15
Bus. 123 ....Investments ... }	Bus. 114 ....Acct. Theory ..	
Bus. 131 ....Banking Policies	Bus. 126 ....Public Finance.	
Bus. 161 ....Sociology	Bus. 132 ....Money Markets.	
I.E. 2 .....Industrial Man. }	Bus. 162 ....Sociology	
Math. 43 ....Math. of Ins... }	I.E. 3 .....Industrial Man. }	
Elective	Elective	3
P.E. 7 .....Physical Ed.	P.E. 8 .....Physical Ed.	—
	18	18

THE COLLEGE OF ENGINEERING

The College of Engineering offers courses of study in

Chemical Engineering
Chemistry
Civil Engineering
Electrical Engineering
Engineering Physics
Industrial Engineering
Mechanical Engineering
Metallurgical Engineering
Mining Engineering

The Curricula

The engineering curricula were formulated on the basis of an intensive study, by the Faculty of Lehigh University, of the problems of technical education and the changing needs of modern industry. This study led to the conclusion that greater emphasis than heretofore should be placed upon the fundamentals of engineering, including mathematics, physics, chemistry, and theoretical and applied mechanics, and less emphasis upon the highly specialized details of engineering practice; and that the engineer must know something of the social sciences, that is, the sciences which deal with human relations, and be familiar with the methods of business organization and administration. The various engineering curricula are arranged accordingly, to increase the time devoted to fundamentals and to nontechnical subjects, which are a part of the equipment of every well educated man and which are now recognized as essential to the proper training of engineers because of their practical applications in industrial and business life.

Among the noteworthy features of the curricula the following may be mentioned:

(1) Provision is made for a uniform freshman year in the College of Engineering, so that no student is required to select his course of study until he is better prepared, after a year of college work, to choose wisely. The requirements in the sopho-

more year for the various curricula are similar although not entirely uniform. A student can, therefore, change from one curriculum to another at the close of the second year with little difficulty.

(2) The work of the first two years is fairly self-contained. To those who for one reason or another are unable to complete their engineering training, it affords preparation for careers as draftsmen, electricians, surveyors, shop foremen, or assistants in industrial laboratories or plants. Students who complete successfully the work of the first two years without conditions or failures and who then withdraw from the University are given a certificate of work completed.

(3) At the close of the second year a comprehensive examination is required on the work of the first two years; and a student's admission to the junior class is based upon (a) his scholastic record for the first two years, (b) the results of his comprehensive examination, and (c) his aptitude for engineering work as determined by his instructors' estimates of his ability to think, of his interest in the subjects taken, and of his accuracy and industry.

(4) Since the University recognizes that an engineer cannot be trained by purely academic process, the degree awarded upon graduation is Bachelor of Science in the particular division of engineering that has been studied, for example, B.S. in Civil Engineering. The successful completion of one year of graduate study leads to the degree of Master of Science in the particular division of engineering studied.

(5) Professional engineering degrees such as Civil Engineer (C.E.), Mechanical Engineer (M.E.), etc., are awarded to graduates of Lehigh University having the degree of Bachelor of Science in Civil Engineering, Bachelor of Science in Mechanical Engineering, etc., who have had not less than five years of acceptable practical experience in responsible charge of work after graduation, and who submit a suitable thesis. A candidate who has received a Master's degree from Lehigh University is eligible for the professional degree on the same basis.

Engineering Conferences

Throughout the freshman year weekly conferences are held by the directors of curricula, to which groups of students must go in turn for orientation, motivation, and vocational guidance. During the sophomore year these conferences are continued in the curriculum of the student's choice. By means of these conferences and by the appraisal made by each instructor throughout the freshman and sophomore years, an estimate of the student's aptitude for further engineering work is attempted.

The Uniform Freshman Year

An outline follows of the work of the freshman year, uniform for all engineering students. For schedules of the work of the upper three years, varying according to the several specialized curricula, see the subsequent pages.

FIRST SEMESTER		FRESHMAN YEAR		SECOND SEMESTER	
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Chem. 1 or 3.	Chemistry	2	Chem. 8	Stoichiometry	1
Chem. 11 or 13.	Chemistry Lab.	2	Chem. 20	Qual. Analysis	3
C.E. 1	Engr. Drawing	2	C.E. 2	Engr. Drawing	2
Engl. 1	English	3	Engl. 2	English	3
Math. 2	Algebra	3	Math. 3	Analytic Geom.	3
Phys. 1	Gen. Physics.	4	Math. 20	Mechanics	4
Math. 20	or Mechanics.		Phys. 1	or Gen. Phys.	
Mil. 1	M. S. & T.	2	Mil. 2	M. S. & T.	2
E.C. 1	Eng. Conferences	—	E.C. 2	Eng. Conferences	—
P.E. 1	Physical Ed.	—	P.E. 2	Physical Ed.	—
Chap. 1	Chapel	—	Chap. 2	Chapel	—
Phil. 5	or Phil. Rel.		Phil. 6	or Phil. Rel.	
Phil. 11	or Eth. Probs.		Phil. 12	or Eth. Probs.	
Psych. 19	or Psych. Con.		Psych. 20	or Psych. Con.	
Engl. 33	or Bibleas Lit.	1	Engl. 34	or Bibleas Lit.	1
		18			18

SUMMER SESSION

For students who at the end of the freshman year elect Electrical Engineering, Engineering Physics, Industrial Engineering, Mechanical Engineering, or Metallurgical Engineering

C.E. 6.....Land and Topographic Surveying..... 4

For students who elect Civil Engineering or Mining Engineering

C.E. 6.....Land and Topographic Surveying..... 4

C.E. 7.....Railroad Surveying 2

For students who elect Chemical Engineering or Chemistry there is no required summer session following the freshman year.

Selection of Specialized Curricula

In the spring of his freshman year each engineering student must announce his selection of the particular engineering curriculum which he desires to continue. This announcement must be made by members of the class of 1934 not later than April 15, 1931.

Options at the End of the Sophomore Year

At the end of the sophomore year three avenues are open to the students:

(1) They may continue the curriculum elected, provided (a) that they have acquired the necessary scholastic record; (b) that they pass the required comprehensive examination on the work of the first two years; (c) that they have exhibited the necessary aptitude for the work of their choice.

(2) They may transfer to other curricula in engineering, to the College of Arts and Science, or to the College of Business Administration, provided: (a) that they have acquired the necessary scholastic record; (b) that they have exhibited the necessary aptitude for the work of their choice.

(3) They may withdraw with a certificate of completion of two years' work, provided that they have satisfactorily completed all of the work of the first two years.

Inspection Trips

Inspection trips to industrial plants are a required part of specific courses in the various curricula in engineering. Written reports or examinations are required. These trips are under the general direction and supervision of the Faculty Committee on Inspection Trips. They are generally held during the senior year and involve an average expense of about \$25.00. The location of the University in the center of industrial activities of various kinds furnishes unusual opportunities for visits of inspection to engineering plants.

THE CURRICULUM IN CHEMICAL ENGINEERING

The curriculum in Chemical Engineering is designed to prepare the student for the profession of chemical engineer, which includes the design, construction, operation, and management of manufacturing establishments in which new substances are produced. Such substances are paper made from wood, gasoline and other petroleum products, cement, coke, gas, dyes, electrochemical products, paints, rubber, leather, foods, and other substances. In addition to the primary requirement of chemistry in all its branches, training of the chemical engineer includes a thorough knowledge of physics and mathematics, and a sound understanding of such fundamentals of chemical, mechanical, and electrical engineering as will make him a discriminating research and operating engineer.

After chemical investigations furnish a better understanding of known processes or develop novel processes or novel methods, it is the particular province of chemical engineering to carry them forward into industrial production. The curriculum is not planned to turn out a specialist restricted to any one type of product; the aim is rather to develop expertness in the sciences and fundamental unit manufacturing processes which underlie all chemical engineering. Some familiarity with factory methods under actual working conditions is acquired through limited contact with operations in nearby plants. Frequent visits for observation and report are made to manufacturing plants in the immediate neighborhood and in the Philadelphia and New York districts.

THE CURRICULUM IN CHEMICAL ENGINEERING

FRESHMAN YEAR

See page 54

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Chem. 6	Adv. Chemistry..	3	Chem. 7	Adv. Chemistry..	3	Chem. 7	Adv. Chemistry..	3
Chem. 30	Quant. Analysis..	3	Chem. 31	Quant. Analysis..	3	Chem. 31	Quant. Analysis..	3
Chem. 41	Quant. Anal. Conf..	1	Chem. 45	Quant. Anal. Conf..	1	Chem. 45	Quant. Anal. Conf..	1
Ger. 1 or 3	German	3	Ger. 2 or 4	German	3	Ger. 2 or 4	German	3
Math. 4	Elem. Calculus..	3	Math. 5	Inter. Calculus..	3	Math. 5	Inter. Calculus..	3
Phys. 6	Elec., Mag. & Heat	3	Phys. 4	Mech., Light, & Sound	3	Phys. 4	Mech., Light, & Sound	3
Phys. 7	Physics Lab....	1	Phys. 5	Physics Lab....	1	Phys. 5	Physics Lab....	1
Mil. 3	M. S. & T.....	2	Mil. 4	M. S. & T.....	2	Mil. 4	M. S. & T.....	2
E.C. 3	Eng. Conferences	—	E.C. 4	Eng. Conferences	—	E.C. 4	Eng. Conferences	—
P.E. 3	Physical Ed.	—	P.E. 4	Physical Ed.	—	P.E. 4	Physical Ed.	—
*Chap. 3	Chapel	—	*Chap. 4	Chapel	—	*Chap. 4	Chapel	—
19			19			19		

SUMMER

Chem. 39 ...Assaying, Coal, Gas, and Oil Analysis..... 4

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
Bus. 3	Economics	3	Bus. 4	Economics	3	Bus. 4	Economics	3
Chem. 78	Chemical Eng....	3	Chem. 161	Organic Chem....	3	Chem. 161	Organic Chem....	3
Chem. 160	Organic Chem....	4	Chem. 166	Org. Chem. Lab..	3	Chem. 166	Org. Chem. Lab..	3
Chem. 165	Org. Chem. Lab..	2	E.E. 56	Electrical Mach..	2	E.E. 56	Electrical Mach..	2
Met. 23	Fer. Metallurgy..	2	E.E. 57	Dynamo Lab....	1	E.E. 57	Dynamo Lab....	1
Met. 83	Met. Problems..	1	M.E. 29	Heat Engines....	3	M.E. 29	Heat Engines....	3
Ger. 7	German	3	Met. 24	Non-fer. Metal..	2	Met. 24	Non-fer. Metal..	2
Biol. 52	or Bacteriol..}	3	Met. 84	Met. Problems..	1	Met. 84	Met. Problems..	1
P.E. 5	Physical Ed.	—	P.E. 6	Physical Ed.	—	P.E. 6	Physical Ed.	—
18			18			18		

SUMMER

M.E. 24Engineering Laboratory 4
Mil. 9 or 19.. or Reserve Officers' Training Corps Camp... 3

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
Chem. 162	Adv. Org. Chem. }	2	Chem. 99	Research Lab....	2	Chem. 99	Research Lab....	2
Chem. 168	.. or Industrial Biochemistry. }		Chem. 138	Ind. Org. Anal...	3	Chem. 138	Ind. Org. Anal...	3
Chem. 180	Chem. Eng. Lab..	3	Chem. 147	Ind. Anal. Conf..	1	Chem. 147	Ind. Anal. Conf..	1
Chem. 190	Physical Chem..	3	Chem. 179	History of Chem..	1	Chem. 179	History of Chem..	1
Chem. 192	Electrochemistry.	1	Chem. 181	Chemical Eng....	3	Chem. 181	Chemical Eng....	3
Chem. 195	Phys. Chem. Lab.	1	Chem. 185	Chem. Eng. Prac.	1	Chem. 185	Chem. Eng. Prac.	1
Chem. 197	Elec. Chem. Lab.	1	Chem. 191	Physical Chem..	2	Chem. 191	Physical Chem..	2
C.E. 9	Mech. of Materials	3	Chem. 196	Phys. Chem. Lab.	1	Chem. 196	Phys. Chem. Lab.	1
Elective			Elective			Elective		
P.E. 7	Physical Ed.	—	P.E. 8	Physical Ed.	—	P.E. 8	Physical Ed.	—
17			17			17		

* Taken by students who elect Chap. 1 and 2 during freshman year.

THE CURRICULUM IN CHEMISTRY

The chemist needs a deep insight into the phenomena of matter and into the many processes in which matter undergoes change and their application to the industrial arts. The graduate in chemistry may use his education to discover and investigate hitherto unknown combinations of matter and of energy, or he may apply known facts and principles to new and useful purposes in manufacture or in the arts. In preparation for a professional career, the training is thorough in fundamentals and leads to a comprehensive understanding of the scientific and industrial achievements of chemistry.

The curriculum offers an education primarily in chemistry, with considerable training in related sciences. The modern conception of an education in chemistry includes a co-ordinate study of physics and mathematics. In addition to these so-called physical sciences, other studies, planned to aid and develop the thought-processes and culture of the student, are embodied in the curriculum. It is believed by many practicing chemists and industrial chemists that an undergraduate course such as this one which includes a liberal allotment of study in the humanities is the best preparation for a successful career both in pure science and in the business application of chemistry.

Since the freshman and sophomore years of this curriculum and of the curriculum in Chemical Engineering are the same, it is possible for a student to change from one curriculum to the other at the end of either semester of the sophomore year.

Numerous supervised visits for study and report at large industrial plants in the immediate neighborhood and in the Philadelphia and New York districts are an integral part of the curriculum.

THE CURRICULUM IN CHEMISTRY

FRESHMAN YEAR

See page 54

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Chem. 6	Adv. Chemistry..	3	Chem. 7	Adv. Chemistry..	3	Chem. 7	Adv. Chemistry..	3
Chem. 30	Quant. Analysis.	3	Chem. 31	Quant. Analysis.	3	Chem. 31	Quant. Analysis.	3
Chem. 41	Quant. Anal. Conf.	1	Chem. 45	Quant. Anal. Conf.	1	Chem. 45	Quant. Anal. Conf.	1
Ger. 1 or 3	German	3	Ger. 2 or 4	German	3	Ger. 2 or 4	German	3
Math. 4	Elem. Calculus..	3	Math. 5	Inter. Calculus..	3	Math. 5	Inter. Calculus..	3
Phys. 6	Elec., Mag. & Heat	3	Phys. 4	Mech., Light, & Sound	3	Phys. 4	Mech., Light, & Sound	3
Phys. 7	Physics Lab....	1	Phys. 5	Physics Lab....	1	Phys. 5	Physics Lab....	1
Mil. 3	M. S. & T.....	2	Mil. 4	M. S. & T.....	2	Mil. 4	M. S. & T.....	2
E.C. 3	Eng. Conferences	—	E.C. 4	Eng. Conferences	—	E.C. 4	Eng. Conferences	—
P.E. 3	Physical Ed.	—	P.E. 4	Physical Ed.	—	P.E. 4	Physical Ed.	—
*Chap. 3	Chapel	—	*Chap. 4	Chapel	—	*Chap. 4	Chapel	—
			19			19		

SUMMER

Chem. 39 ...Assaying, Ccal, Gas, and Oil Analysis..... 4

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
Bus. 3	Economics	3	Bus. 4	Economics	3	Bus. 4	Economics	3
Chem. 78	Chemical Eng... 3		Chem. 161	Organic Chem... 3		Chem. 161	Organic Chem... 3	
Chem. 160	Organic Chem... 4		Chem. 166	Org. Chem. Lab. 3		Chem. 166	Org. Chem. Lab. 3	
Chem. 165	Org. Chem. Lab. 2		Engl. 5, 11 or 41	English	3	Engl. 5, 11 or 41	English	3
Engl. 4 or 6	English	3	Geol. 4	Gen. Geology. 2		Geol. 4	Gen. Geology. 2	
Ger. 3	German	3	Geol. 6	& Field Trips. 1		Geol. 6	& Field Trips. 1	
Fr. 1	or French ... }		Bus. 18	or Accounting }		Bus. 18	or Accounting }	
P.E. 5	Physical Ed. ... —		Ger. 4	German	3	Ger. 4	German	3
			Fr. 2	or French ... }		Fr. 2	or French ... }	
			P.E. 6	Physical Ed. ... —		P.E. 6	Physical Ed. ... —	
			18			18		

SUMMER

Chem. 50 ...Industrial Employment

Mil. 9 or 19.. or Reserve Officers' Training Corps Camp... 3

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
Chem. 162	Adv. Org. Chem. }		Chem. 99	Research Lab....	2	Chem. 99	Research Lab....	2
Chem. 168	or Industrial Biochemistry. }	2	Chem. 138	Ind. Org. Anal... 3		Chem. 138	Ind. Org. Anal... 3	
Chem. 180	Chem. Eng. Lab. 3		Chem. 147	Ind. Anal. Conf. 1		Chem. 147	Ind. Anal. Conf. 1	
Chem. 190	Physical Chem... 3		Chem. 179	History of Chem. 1		Chem. 179	History of Chem. 1	
Chem. 192	Electrochemistry. 1		Chem. 181	Chemical Eng... 3		Chem. 181	Chemical Eng... 3	
Chem. 195	Phys. Chem. Lab. 1		Chem. 185	Chem. Eng. Prac. 1		Chem. 185	Chem. Eng. Prac. 1	
Chem. 197	Elec. Chem. Lab. 1		Chem. 191	Physical Chem... 2		Chem. 191	Physical Chem... 2	
Any two of the following:			Chem. 196	Phys. Chem. Lab. 1		Chem. 196	Phys. Chem. Lab. 1	
Biol. 1	Biology		Biol. 153	Adv. Bacteriol. }		Biol. 153	Adv. Bacteriol. }	
Biol. 52	Bacteriology ... }		Bus. 18	or Accounting }		Bus. 18	or Accounting }	
Bus. 25	Corp. Finance... }		Met. 24	or Non-fer. }		Met. 24	or Non-fer. }	
Met. 23	Ferrous Met... 2		Met. 84	& Met. Prob. 1		Met. 84	& Met. Prob. 1	
Met. 83	& Met. Prob. 1		Phys. 161	or Physics... }		Phys. 161	or Physics... }	
Phys. 160	Physics			or Elective... }			or Elective... }	
	Elective		P.E. 8	Physical Ed. ... —		P.E. 8	Physical Ed. ... —	
P.E. 7	Physical Ed. ... —		17			17		

* Taken by students who elect Chap. 1 and 2 during freshman year.

THE CURRICULUM IN CIVIL ENGINEERING

The purpose of this curriculum is to give a broad education in those general and scientific subjects which form the foundation of all engineering, and a special training in the field of civil engineering, which includes the building of highways, railroads, harbors, docks and terminals, bridges, buildings, subways, tunnels, water supply and purification plants, sewerage systems and sewage disposal plants, water power developments and surveys. To enable the civil engineering graduate to deal with allied technical problems arising in most civil engineering projects of today, the curriculum includes certain special studies in the fields of mechanical and electrical engineering, geology, and metallurgy. Courses in economics, accounting, and finance have been added since it is essential that the graduate should have a knowledge of the fundamentals of business.

The work of the first three years is chiefly in those mathematical and scientific subjects which form the basis of all civil engineering construction and practice. In the fourth year the application of these basic principles is studied in geodesy, in structural, hydraulic, sanitary and transportation engineering, the major divisions of the wide field of civil engineering. In general it is considered inadvisable for the student to specialize at this stage of his preparation. He should rather attempt to gain a comprehension of the whole range of work of his future profession. Students of maturity, however, who have a definite vocational objective, may, on petition, be allowed to vary their program from the fixed curriculum which follows and by wise choice of substituted subjects may prepare more definitely for their future professional work than is permitted by the fixed schedule.

The positions open to graduates include those of inspector, timekeeper, and engineering assistant on construction work, instrument man on surveys, draftsman, computer, and engineering apprentice. The last named follows the course of study prescribed by some of the large structural steel and other engineering companies for their beginning engineers.

THE CURRICULUM IN CIVIL ENGINEERING

FRESHMAN YEAR

See page 54

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
C.E. 11	.....Railroads	3	C.E. 16	.....Highway Eng.	3			
Geol. 1a	.....Mineralogy	3	Geol. 4	.....General Geology	2			
Math. 4	.....Elem. Calculus	3	Geol. 6	.....Field Trips	1			
Phys. 6	.....Elec., Mag. & Heat	3	Math. 5	.....Inter. Calculus	3			
Phys. 7	.....Physics Lab.	1	Phys. 4	.....Mech., Heat & Sound	3			
Engl. 20	.....American Lit.	3	Phys. 5	.....Physics Lab.	1			
F.A. 3	.....or Hist. of Arch.	3	Engl. 21	.....American Lit.	3			
Hist. 27	.....or Eurpn. Exp.	2	F.A. 4	.....or Hist. of Arch.	2			
Mil. 3	.....M. S. & T.	2	Hist. 28	.....or Eurpn. Exp.	2			
E.C. 3	.....Eng. Conferences	—	Mil. 4	.....M. S. & T.	2			
P.E. 3	.....Physical Ed.	—	E.C. 4	.....Eng. Conferences	—			
*Chap. 3	.....Chapel	—	P.E. 4	.....Physical Ed.	—			
		18	*Chap. 4	.....Chapel	—			18

SUMMER

Mil. 9 or 19...Reserve Officers' Training Corps Camp, for those who elect Advanced Military Science and Tactics, 3

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
Bus. 3	.....Economics	3	Bus. 4	.....Economics	3			
C.E. 8	.....Mech. of Materials	4	C.E. 12	.....Hydraulics	3			
C.E. 10	.....Mat. Testing Lab.	1	C.E. 14	.....Hydraulics Lab.	1			
E.E. 50	.....Dyn. & Motors	2	C.E. 15	.....Stresses	4			
E.E. 51	.....Dynamo Lab.	1	E.E. 52	.....Alt. Currents	2			
Math. 6	.....Adv. Calculus	3	E.E. 53	.....Dynamo Lab.	1			
M.E. 29	.....Heat Engines	3	Math. 21	.....Anal. Mechanics	3			
P.E. 5	.....Physical Ed.	—	M.E. 19	.....Engineering Lab.	1			
		17	P.E. 6	.....Physical Ed.	—			18

SUMMER

C.E. 29Industrial Employment

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
C.E. 118	.....Str. Steel Design	4	Bus. 18	.....Accounting	3			
C.E. 119	.....Br. & Bldg. Constr.	2	C.E. 25	.....Foundations	2			
C.E. 125	.....Reinf. Concrete	3	C.E. 121	.....Hyd. & W.P. Eng.	4			
C.E. 126	.....Cem. & Con. Lab.	1	Bus. 162	.....Sociology	3			
C.E. 128	.....Sanitary Eng.	3	Govt. 156	.....or Int. Law	3			
Bus. 161	.....Sociology	3	Hist. 130	.....or Am. For. Pol.	3			
Govt. 159	.....or Pol. C. & P.	3	Psych. 5	.....or Psych.	3			
Hist. 129	.....or Am. For. Pol.	3	Astr. 3	.....Prac. Astronomy	3			
Phil. 17	.....or Philosophy	3	Biol. 50	.....or San. Bac.	3			
Astr. 2	.....Gen. Astronomy	3	Engl. 41 or 42	.....or English	2			
Biol. 1	.....or Biology	3	Met. 24	.....or Metal	2			
Bus. 25	.....or Corp. Fin.	3	Met. 84	.....& Met. Prob. 1	2			
C.E. 27	.....or Con. & Spec.	2	C.E. 122	.....Geodesy	3			
Met. 21	.....or Metal	2	C.E. 123	.....or R.R. & Ter.	3			
Met. 81	.....& Met. Prob. 1	—	C.E. 124	.....or Higher Str.	3			
Math. †	.....	—	C.E. 131	.....or Ad. San. Eng.	3			
P.E. 7	.....Physical Ed.	—	C.E. 132	.....or Ad. Hgy. Eng.	3			
		19	C.E. 50	.....Thesis	—			
			Math. †	.....	—		
			P.E. 8	.....Physical Ed.	—			

SUMMER

* Taken by students who elect Chap. 1 and 2 during freshman year.
 † Students who have completed Math. 21 with high standing may elect Math. 111, 112, 122, 123, or 124 on approval of the Director of the Curriculum.

THE CURRICULUM IN ELECTRICAL ENGINEERING

The electrical engineer is one who understands the science and art of economically "directing the sources of electrical power in nature for the uses and conveniences of man." He may design, manufacture, install, or operate electrical machinery and appliances, manage plants and electric systems, or engage in the promotion of engineering projects.

The object of this curriculum is to give broad education in those general and scientific subjects which underlie all the branches of engineering, and to give special training in those technical and business subjects which experience shows are most essential to the equipment of the electrical engineer. In seeking to accomplish this object the Department puts chief emphasis upon mastery of the mathematical-physical principles and thoroughness in the analysis of problems.

The curriculum includes a number of special studies in civil, mechanical, and metallurgical engineering, so that the graduate in electrical engineering is prepared not only to enter any of the branches of electrical engineering but also to deal with related problems in the other divisions of engineering. The electrical engineering graduate of today finds that professional advancement often lies through commercial, managerial, or executive channels. As superintendent or manager of electric light, power, or railway properties he must be prepared to handle problems involving not merely material and technical details but human relations with workmen, capitalists, public utility commissioners, and the public. He must know something of the principles of accounting, economics, business law, and industrial management. A number of such studies have been introduced into the curriculum.

THE CURRICULUM IN ELECTRICAL ENGINEERING

FRESHMAN YEAR

See page 54

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
E.E. 1	Principles of E.E.	1	E.E. 2	Direct Cur. Mach.	3			
Math. 4	Elem. Calculus	3	E.E. 3	Elem. Dyn. Lab.	1			
M.E. 22	Heat Engines	3	Math. 5	Inter. Calculus	3			
Met. 21	Metallurgy	2	M.E. 23	Heat Engines	3			
Met. 81	Met. Problems	1	Phys. 4	Mech., Light, & Sound	3			
Phys. 6	Elec., Mag. & Heat	3	Phys. 5	Physics Lab.	1			
Phys. 7	Physics Lab.	1	Engl.	English or Foreign Language	3			
Engl.	English or Foreign Language	3	Mil. 4	M. S. & T.	2			
Mil. 3	M. S. & T.	2	E.C. 4	Eng. Conferences	—			
E.C. 3	Eng. Conferences	—	P.E. 4	Physical Ed.	—			
P.E. 3	Physical Ed.	—	*Chap. 4	Chapel	—			
*Chap. 3	Chapel	—						
		19						19

SUMMER

Mil. 9 or 19..Reserve Officers' Training Corps Camp, for those who elect Advanced Military Science and Tactics, 3

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
Biol. 1	Biology	3	Bus. 4	Economics	3			
Bus. 3	Economics	3	C.E. 13	Hydraulics	2			
C.E. 9	Mech. of Materials	3	C.E. 14	Hydraulics Lab.	1			
C.E. 10	Mat. Testing Lab.	1	E.E. 6	Adv. Alt. Cur.	3			
E.E. 4	Alt. Currents	3	E.E. 8	Inter. Dyn. Lab.	2			
E.E. 5	Inter. Dyn. Lab.	1	Math. 21	Anal. Mechanics	3			
Math. 6	Adv. Calculus	3	Phys. 11	Adv. Elec. Lab.	1			
Phys. 10	Adv. Elec. Lab.	1	Geol. 4	Gen. Geology	2			
P.E. 5	Physical Ed.	—	Geol. 6	& Field Trips	1			
		18	Psych. 5	or Psychology	3			
			P.E. 6	Physical Ed.	—			
								18

SUMMER

E.E. 24Industrial Employment

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
E.E. 11	Adv. Dynamo Lab.	3	Bus. 18	Accounting	3			
E.E. 15	E.E. Seminar	1	E.E. 16	E.E. Seminar	2			
E.E. 112	A.C. Machinery	3	E.E. 19	Adv. Dynamo Lab.	2			
E.E. 114	Elec. Stations	3	E.E. 118	Elec. Power Trans.	3			
M.E. 21	Engineering Lab.	1	M.E. 25	Engineering Lab.	1			
E.E. 21	Elec. Com.	3	Any two of the following:					
E.E. 23	or Thesis	3	E.E. 20	Elec. Traction	6			
E.E. 113	or Elec. Design	3	E.E. 23	Thesis	6			
Bus. 25	Corp. Finance	3	E.E. 26	Elec. Com.	6			
Engl. 4	or English	3	E.E. 122	Elec. Transients	—			
Hist. 13	or History	—	Engl. 5	English	—			
Math. †		—	Math. †		—			
P.E. 7	Physical Ed.	—	P.E. 8	Physical Ed.	—			
		17						17

* Taken by students who elect Chap. 1 and 2 during freshman year.

† If elected, to be taken for one semester only.

† Students who have completed Math. 21 with high standing may elect Math. 111, 112, 122, 123, or 124 on approval of the Director of the Curriculum.

THE CURRICULUM IN ENGINEERING PHYSICS

The recognition of the economic value of scientific investigation and the realization that growth and expansion follow upon research have led to the establishment of research laboratories in every field of industry. Scientific research has assumed an importance as a basis of industry equal to the exploitation of natural resources and must in the future become increasingly important as natural resources diminish. The amazing expansion in the electrical industries is to a very large extent the result of research. The statement applies more or less to every major industry, among the products of which may be listed the incandescent lamp, the telephone, radio, automobile, airplane, talking movies, optical glass, and scientific instruments and equipment.

The research laboratories of the government are keeping pace with the industrial needs of the country, for example, the laboratories of the Bureau of Standards, the Bureau of Mines, the Naval Research Laboratory, etc. The universities have reflected the spirit of the age in the expansion of research facilities and research productivity. In every field of industry, government service, and education there is an insistent demand for men trained in the methods and technique of research.

Three avenues are open to the trained physicist: (1) he may enter an industrial research laboratory; (2) he may enter one of the great government laboratories; (3) he may become a university teacher and investigator. As to ultimate attainment it is the common experience of research men to advance to positions of high executive and administrative responsibility. The research laboratory is a direct route to such advance. The thorough training in fundamentals, coupled with the specialized knowledge obtained through research, is the best qualification for administrative work in connection with the products of research.

THE CURRICULUM IN ENGINEERING PHYSICS

FRESHMAN YEAR

See page 54

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Bus. 3	.....Economics	3	Bus. 4	.....Economics	3	Bus. 4	.....Economics	3
Ger. 1 or 3	.....German	3	Ger. 2 or 4	.....German	3	Ger. 2 or 4	.....German	3
Math. 4	.....Elem. Calculus	3	Math. 5	.....Inter. Calculus	3	Math. 5	.....Inter. Calculus	3
Phys. 6	.....Elec., Mag. & Heat	3	Phys. 4	.....Mech., Light, & Sound	3	Phys. 4	.....Mech., Light, & Sound	3
Phys. 7	.....Physics Lab.	1	Phys. 5	.....Physics Lab.	1	Phys. 5	.....Physics Lab.	1
Chem. 6	.....Adv. Chemistry.	3	Chem. 7	.....Adv. Chemistry.	3	Chem. 7	.....Adv. Chemistry.	3
Geol. 1a	.....or Mineralogy	3	Geol. 4	.....or Geology	2	Geol. 4	.....or Geology	2
Mil. 3	.....M. S. & T.	2	Geol. 6	.....& Field Trips	1	Geol. 6	.....& Field Trips	1
E.C. 3	.....Eng. Conferences	—	Mil. 4	.....M. S. & T.	2	Mil. 4	.....M. S. & T.	2
P.E. 3	.....Physical Ed.	—	E.C. 4	.....Eng. Conferences	—	E.C. 4	.....Eng. Conferences	—
*Chap. 3	.....Chapel	—	P.E. 4	.....Physical Ed.	—	P.E. 4	.....Physical Ed.	—
			*Chap. 4	.....Chapel	—	*Chap. 4	.....Chapel	—
18			18			18		

SUMMER

Mil. 9 or 19..Reserve Officers' Training Corps Camp, for those who elect Advanced Military Science and Tactics, 3

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
Math. 6	.....Adv. Calculus	3	Math. 21	.....Anal. Mechanics	3	Math. 21	.....Anal. Mechanics	3
Phys. 10	.....Adv. Elec. Lab.	1	Phys. 11	.....Adv. Elec. Lab.	1	Phys. 11	.....Adv. Elec. Lab.	1
Phys. 122	.....Light	3	Phys. 126	.....Heat	3	Phys. 126	.....Heat	3
Phys. 162	.....Th. Elec. & Mag.	3	Phys. 163	.....Th. Elec. & Mag.	3	Phys. 163	.....Th. Elec. & Mag.	3
E.E. 50	.....Dyn. & Motors	2	E.E. 52	.....Alt. Currents	2	E.E. 52	.....Alt. Currents	2
E.E. 51	.....& Dyn. Lab.	1	E.E. 53	.....& Dyn. Lab.	1	E.E. 53	.....& Dyn. Lab.	1
M.E. 22	.....or Heat Eng.	3	M.E. 23	.....or Heat Eng.	3	M.E. 23	.....or Heat Eng.	3
Ger. 3	.....German	3	Ger. 4	.....German	3	Ger. 4	.....German	3
Fr. 1	.....or French	3	Fr. 2	.....or French	3	Fr. 2	.....or French	3
	.....Elective	3		.....Elective	3		.....Elective	3
P.E. 5	.....Physical Ed.	—	P.E. 6	.....Physical Ed.	—	P.E. 6	.....Physical Ed.	—
19			19			19		

SUMMER

Phys. 50Industrial Employment

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
Phys. 120	.....Electric Waves	3	Phys. 124	.....El. Dis. in Gases	3	Phys. 124	.....El. Dis. in Gases	3
Phys. 160	.....Mod. Theories	3	Phys. 161	.....Mod. Theories	3	Phys. 161	.....Mod. Theories	3
Phys. 164	.....Advanced Lab.	2	Phys. 165	.....Advanced Lab.	2	Phys. 165	.....Advanced Lab.	2
C.E. 9	.....Mech. of Mat.	3	E.E. 122	.....Elec. Transients	3	E.E. 122	.....Elec. Transients	3
Chem. 190	.....or Ph. Chem.	2	Chem. 191	.....or Ph. Chem.	2	Chem. 191	.....or Ph. Chem.	2
Chem. 195	.....& Lab.	1	Chem. 196	.....& Lab.	1	Chem. 196	.....& Lab.	1
Geol. 111	.....or Field Geol.	2	Geol. 110	.....or Str. Geol.	2	Geol. 110	.....or Str. Geol.	2
Geol. 114	.....& Str. Geol.	1	Geol. 115	.....& Geol. Meth.	1	Geol. 115	.....& Geol. Meth.	1
Math. 111	.....or Ad. Dif. Eq.	3	Math. 112	.....or Ad. Dif. Eq.	3	Math. 112	.....or Ad. Dif. Eq.	3
Met. 21	.....or Eng. Met.	2	Math. 124	.....or Theo. of Er.	2	Math. 124	.....or Theo. of Er.	2
Met. 81	.....& Met. Prob.	1	Met. 21	.....or Eng. Met.	2	Met. 21	.....or Eng. Met.	2
Math.†	.....	—	Met. 81	.....& Met. Prob.	1	Met. 81	.....& Met. Prob.	1
	.....Electives	6	Math.†	.....	—	Math.†	.....	—
P.E. 7	.....Physical Ed.	—		.....Electives	6		.....Electives	6
17			P.E. 8	.....Physical Ed.	—	P.E. 8	.....Physical Ed.	—
17			17			17		

* Taken by students who elect Chap. 1 and 2 during freshman year.

† Students who have completed Math. 21 with high standing may elect Math. 122, 123, or 124 on approval of the Director of the Curriculum.

THE CURRICULUM IN INDUSTRIAL ENGINEERING

Industrial engineering has to do with the organization, operation, and management of manufacturing plants, public utilities, and operating, holding, and management companies. Broadly considered, it covers the engineering aspects of plant location, plant layout, routing, production control, maintenance, stores, and inspection; the economic aspects of employment, employee training, promotion, wage payment, bonus, safety and welfare, insurance, and old age pensions; and the commercial aspects of purchasing, marketing, credit, accounting, and finance.

Industrial enterprises depend on sound financing, adequate accounting, and intelligent forecasting of economic developments. Technical skill and engineering efficiency are primary requisites, but these alone are not sufficient. There is a demand by industry for men who have not only a thorough training in the fundamentals of engineering, but also a knowledge of the problems of accounting, finance, statistics, and management which every enterprise encounters. The object of the curriculum in Industrial Engineering is to add a knowledge of the basis facts of economics, finance, and management to the technical knowledge and scientific spirit that come from the study of engineering.

The curriculum in Industrial Engineering is primarily an engineering curriculum supplemented by courses in economics and business administration, so chosen as to provide a thorough training in the fundamental principles of economics, industrial management, corporation financing, and business practice. The curriculum is designed primarily to meet the needs of that considerable body of students who intend to enter industries essentially technical, whether public utilities or manufacturing plants, but who intend to go into the administrative departments.

THE CURRICULUM IN INDUSTRIAL ENGINEERING

FRESHMAN YEAR

See page 54

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Bus. 3	Economics	3	Bus. 4	Economics	3	Bus. 4	Economics	3
Math. 4	Elem. Calculus	3	Math. 5	Inter. Calculus	3	Math. 5	Inter. Calculus	3
M.E. 1	Elem. Mach. Des.	3	M.E. 4	Elem. Mach. Des.	3	M.E. 4	Elem. Mach. Des.	3
Phys. 6	Elec., Mag. & Heat	3	Phys. 4	Mech., Light, & Sound	3	Phys. 4	Mech., Light, & Sound	3
Phys. 7	Physics Lab.	1	Phys. 5	Physics Lab.	1	Phys. 5	Physics Lab.	1
Engl.	English or Foreign Language	3	Engl.	English or Foreign Language	3	Engl.	English or Foreign Language	3
Govt. 51	or Amer. Govt.	2	Govt. 52	or Amer. Govt.	2	Govt. 52	or Amer. Govt.	2
Mil. 3	M. S. & T.	2	Mil. 4	M. S. & T.	2	Mil. 4	M. S. & T.	2
E.C. 3	Eng. Conferences	—	E.C. 4	Eng. Conferences	—	E.C. 4	Eng. Conferences	—
P.E. 3	Physical Ed.	—	P.E. 4	Physical Ed.	—	P.E. 4	Physical Ed.	—
*Chap. 3	Chapel	—	*Chap. 4	Chapel	—	*Chap. 4	Chapel	—
18			18			18		

SUMMER

Mil. 9 or 19..Reserve Officers' Training Corps Camp, for those who elect Advanced Military Science and Tactics, 3

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
Bus. 11	Accounting	3	Bus. 12	Accounting	3	Bus. 12	Accounting	3
Bus. 21	Corp. Finance	3	Bus. 22	Corp. Finance	3	Bus. 22	Corp. Finance	3
Bus. 29	Money & Banking	3	Bus. 30	Money & Banking	3	Bus. 30	Money & Banking	3
C.E. 9	Mech. of Materials	3	C.E. 13	Hydraulics	2	C.E. 13	Hydraulics	2
M.E. 22	Heat Engines	3	C.E. 14	Hydraulics Lab.	1	C.E. 14	Hydraulics Lab.	1
M.E. 30	Mechanism	3	E.E. 50	Dyn. & Motors	2	E.E. 50	Dyn. & Motors	2
P.E. 5	Physical Ed.	—	E.E. 51	Dynamo Lab.	1	E.E. 51	Dynamo Lab.	1
18			M.E. 10	Thermodynamics	3	M.E. 10	Thermodynamics	3
			P.E. 6	Physical Ed.	—	P.E. 6	Physical Ed.	—
			18			18		

SUMMER

I.E. 1Industrial Employment

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
Bus. 33	Labor Problems	3	Bus. 56	Business Law	3	Bus. 56	Business Law	3
Bus. 45	Statistics	3	Bus. 126	Public Finance	3	Bus. 126	Public Finance	3
E.E. 52	Alt. Currents	2	E.E. 54	Electrical Eng.	2	E.E. 54	Electrical Eng.	2
E.E. 53	Dynamo Lab.	1	E.E. 55	Dynamo Lab.	1	E.E. 55	Dynamo Lab.	1
I.E. 2	Industrial Man.	3	I.E. 3	Industrial Man.	3	I.E. 3	Industrial Man.	3
Met. 21	Metallurgy	2	I.E. 4	Industrial Power	3	I.E. 4	Industrial Power	3
Met. 81	Met. Problems	1	Elective			Elective		
18			P.E. 8	Physical Ed.	—	P.E. 8	Physical Ed.	—
P.E. 7	Physical Ed.	—	18			18		

* Taken by students who elect Chap. 1 and 2 during freshman year.

THE CURRICULUM IN MECHANICAL ENGINEERING

Mechanical engineering deals with the design, construction, installation and operation of machinery necessary for the economical and advantageous use of power, and with the management of industries and organizations manufacturing and using power-driven equipment. The young graduate ordinarily goes into a graduate apprenticeship in some public utility, manufacturing or selling organization, from which he may work up to a position as power engineer, works manager, sales engineer, engineering designer, or executive officer.

The freshman and sophomore years of the curriculum are concerned largely with the fundamentals of mathematics, physics, chemistry, and engineering drawing. Machine Design and Heat Engines are begun in the sophomore year. More advanced mechanical engineering subjects include Engineering Laboratory, Thermodynamics, Mechanism, advanced Heat Engines, and advanced Machine Design. Among the topics considered are fuels, combustion, steam boilers and furnaces, properties of steam, power plant auxiliaries, steam engines, steam turbines, internal combustion engines, power plants, refrigeration, heating and ventilation, pumps, air compressors, and machine tools. Comprehensive tests are made of boilers, power plants, and pumping stations in the neighborhood. Experimental work in engineering laboratory is required throughout the junior and senior years.

THE CURRICULUM IN MECHANICAL ENGINEERING

FRESHMAN YEAR

See page 54

FIRST SEMESTER			SOPHOMORE YEAR		SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.		
Math. 4	Elem. Calculus..	3	Math. 5	Inter. Calculus..	3		
M.E. 1	Elem. Mach. Des.	3	M.E. 4	Elem. Mach. Des.	3		
M.E. 2	Elem. Heat Eng.	3	M.E. 5	Heat Engines...	3		
Phys. 6	Elec., Mag. & Heat	3	Phys. 4	Mech., Light, & Sound	3		
Phys. 7	Physics Lab....	1	Phys. 5	Physics Lab....	1		
Engl.	English	3	Engl.	English	3		
	or Foreign			or Foreign			
	Language			Language			
Mil. 3	M. S. & T.....	2	Mil. 4	M. S. & T.....	2		
E.C. 3	Eng. Conferences	—	E.C. 4	Eng. Conferences	—		
P.E. 3	Physical Ed.	—	P.E. 4	Physical Ed.	—		
*Chap. 3	Chapel	—	*Chap. 4	Chapel	—		
		18			18		

SUMMER

Mil. 9 or 19..Reserve Officers' Training Corps Camp, for those who elect
Advanced Military Science and Tactics, 3

FIRST SEMESTER			JUNIOR YEAR		SECOND SEMESTER		
Bus. 3	Economics	3	Bus. 4	Economics	3		
C.E. 9	Mech. of Materials	3	E.E. 50	Dyn. & Motors...	2		
C.E. 10	Mat. Testing Lab.	1	E.E. 51	Dynamo Lab....	1		
Math. 6	Adv. Calculus...	3	Math. 21	Anal. Mechanics.	3		
M.E. 9	Engineering Lab.	1	M.E. 6	Mechanism	4		
M.E. 10	Thermodynamics.	3	M.E. 11	Engineering Lab.	1		
Met. 21	Metallurgy	2	M.E. 108	Heat Engines...	3		
Met. 33	Metallurgy Lab..	1	Met. 34	Metallurgy Lab..	1		
Met. 81	Met. Problems...	1	P.E. 6	Physical Ed.	—		
P.E. 5	Physical Ed.	—			18		
		18			18		

SUMMER

I.E. 1Industrial Employment

FIRST SEMESTER			SENIOR YEAR		SECOND SEMESTER		
C.E. 13	Hydraulics	2	E.E. 54	Electrical Eng...	2		
C.E. 14	Hydraulics Lab.	1	E.E. 55	Dynamo Lab....	1		
E.E. 52	Alt. Currents...	2	M.E. 116	Adv. Design....	4		
E.E. 53	Dynamo Lab....	1	M.E. 117	Adv. Mech. Eng.	3		
M.E. 112	Adv. Design....	4	M.E. 118	Engineering Lab.	2		
M.E. 113	Adv. Mech. Eng.	3	Engl. 41 or 42	English	3		
M.E. 114	Engineering Lab.	2	M.E. 15	or Thesis....			
Bus. 25	Corp. Finance..	3		or approved			
I.E. 2	or Ind. Man..			Elective ..	3		
Bus. 45	or Statistics..		Bus. 18	Accounting			
Math. †		—	I.E. 3	or Ind. Man..	3		
P.E. 7	Physical Ed.	—	Bus. 56	or Bus. Law..			
		18	Math. †				
		18	P.E. 8	Physical Ed.	—		
		18			18		

* Taken by students who elect Chap. 1 and 2 during freshman year.

† Students who have completed Math. 21 with high standing may elect
Math. 111, 112, 122, 123, or 124 on approval of the Director of the
Curriculum.

THE CURRICULUM IN METALLURGICAL ENGINEERING

The object of this curriculum is the preparation of the student for practice in engineering generally, and particularly in the fields of metallurgy. These cover three general types of practice, namely: (1) the production, refining, and preparation for use of the metals, such as iron, steel, copper, lead, zinc, aluminum, etc.; (2) the intelligent use of all metals and alloys in industries, for structures, railroads, automobiles, airplanes, machinery, vehicles, pipe, tools, hardware, ordnance, wire products, etc.; (3) the so-called "service" or "sales" division of industry. The day has passed when sales departments can carry on their work without the aid of trained engineers; problems must be discussed with customers which only a man, thoroughly trained technically and entirely familiar with the customers' engineering needs and the possibilities of filling these needs with metals or alloys, can intelligently handle.

The purpose of the curriculum is to train men so broadly in the fundamentals of engineering that every graduate shall know the basic principles on which the science of engineering is founded. In addition, the chief aspects of each department of engineering—chemical, civil, electrical, industrial, mechanical, and mining—are studied briefly.

The metallurgy courses include a development of the basic principles of chemistry, physics, and economics as applied to metallurgy. In addition, the student is familiarized with the most modern practice in each division of metallurgy. This instruction is co-ordinated with visits to plants manufacturing or using metals or alloys. For this purpose, Bethlehem, the center of one of the largest industrial districts in the world, is well situated.

THE CURRICULUM IN METALLURGICAL ENGINEERING

FRESHMAN YEAR

See page 54

FIRST SEMESTER			SOPHOMORE YEAR		SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.		
Chem. 33	Quant. Analysis.	3	Geol. 4	General Geology.	2		
Chem. 44	Quant. Anal. Conf.	1	Geol. 6	Field Trips	1		
Math. 4	Elem. Calculus.	2	Math. 5	Inter. Calculus.	3		
Met. 1	Gen. Metallurgy.	2	Met. 33	Metallurgy Lab.	1		
Phys. 6	Elec., Mag. & Heat	3	Met. 61	Met. Problems.	1		
Phys. 7	Physics Lab.	1	Phys. 4	Mech., Light, & Sound	3		
Ger. 1 or 3	German	3	Phys. 5	Physics Lab.	1		
Fr. 1 or 11	or French		Phys. 6	German	3		
Mil. 3	M. S. & T.	2	Fr. 2 or 12	or French	3		
E.C. 3	Eng. Conferences	—	Mil. 4	M. S. & T.	2		
P.E. 3	Physical Ed.	—	E.C. 4	Eng. Conferences	—		
*Chap. 3	Chapel	—	P.E. 4	Physical Ed.	—		
			*Chap. 4	Chapel	—		
		18			17		

SUMMER

Chem. 39	Assaying, Coal, Gas, and Oil Analysis	4
Met. 48	or Industrial Employment	
Mil. 9 or 19	or Reserve Officers' Training Corps Camp	3

FIRST SEMESTER		JUNIOR YEAR		SECOND SEMESTER	
Bus. 3	Economics	3	Bus. 4	Economics	3
Chem. 6	Adv. Chemistry.	3	Chem. 98	Physical Chem.	2
C.E. 9	Mech. of Materials	3	E.E. 50	Dyn. & Motors.	2
C.E. 10	Mat. Testing Lab.	1	E.E. 51	Dynamo Lab.	1
Geol. 1a	Mineralogy	3	M.E. 23	Heat Engines.	3
M.E. 22	Heat Engines.	3	Met. 2	Met. of I. & S.	2
Met. 25	Electrochemistry.	2	Met. 44	Plant Visits	1
Met. 35	Elec. Chem. Lab.	1	Met. 62	Met. Problems.	1
P.E. 5	Physical Ed.	—	Met. 130	Physical Met.	3
		19	P.E. 6	Physical Ed.	—

SUMMER

Met. 49	Industrial Employment	
---------	-----------------------	--

FIRST SEMESTER		SENIOR YEAR		SECOND SEMESTER	
E.E. 52	Alt. Currents.	2	Geol. 108	Economic Geol.	3
E.E. 53	Dynamo Lab.	1	Met. 4	Met. of Zinc, Aluminum, etc.	2
M.E. 19	Engineering Lab.	1	Met. 46	Plant Visits	1
Met. 3	Met. of Copper, Lead, Gold, & Silver	2	Met. 132	Metallurgy Lab.	2
Met. 131	Metallurgy	3	Met. 140	Seminar	1
Met. 139	Seminar	2	Met. 152	Adv. Met. I. & S.	2
Met. 163	Met. Problems.	1	Met. 164	Met. Problems.	1
Mine. 3	Ore Dressing	3		Electives	6
	Elective	3	P.E. 8	Physical Ed.	—
P.E. 7	Physical Ed.	—			
		18			18

* Taken by students who elect Chap. 1 and 2 during freshman year.

THE CURRICULUM IN MINING ENGINEERING

Mining Engineering has to do with the extraction of raw materials of economic value from the earth and their preparation for the needs of modern civilization. Mining, therefore, constitutes one of the great basic industries of the present age, as all industries are absolutely dependent upon it, in greater or less degree, for their supplies of metals, coal, petroleum, gas, stone, cement, building materials, and other mineral products which are used in the arts and in manufacturing.

The actual work of mining itself constitutes but a part of the duties which devolve upon the mining engineer, and much of his activity is divided among the broader problems concerning geology, exploration, plant construction, operation and maintenance, transportation, ore treatment and reduction, coal preparation, oil and gas technology, and general administration.

The basic scientific training is given during the first and second years, and includes mathematics, physics, chemistry, mineralogy, geology, with laboratory work; the special technical training is received during the third and fourth years, and includes instruction in mechanics of materials, hydraulics, fuels, generation and utilization of power, metallurgy, economic geology, construction, mining, coal and ore preparation, economics and allied business subjects.

Mining engineers have contributed in large degree to the phenomenal growth in wealth and power of the United States and of the Latin American countries. Mining engineers, as in the past, still continue to be the most important factors in the exploitation and development of the mineral resources of practically every country in the world.

THE CURRICULUM IN MINING ENGINEERING

FRESHMAN YEAR

See page 54

FIRST SEMESTER			SOPHOMORE YEAR			SECOND SEMESTER		
Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.	Number	Title	Cr.Hrs.
Chem. 36	Quant. Analysis..	2	Chem. 37	Quant. Analysis..	2	Chem. 37	Quant. Analysis..	2
Chem. 48	Quant. Anal. Conf.	1	Chem. 49	Quant. Anal. Conf.	1	Chem. 49	Quant. Anal. Conf.	1
Geol. 1	Mineralogy	4	Geol. 4	Geology	2	Geol. 4	Geology	2
Math. 4	Elem. Calculus..	3	Geol. 5	Petrology	1	Geol. 5	Petrology	1
M.E. 22	Heat Engines...	3	Geol. 6	Field Trips...	1	Geol. 6	Field Trips...	1
Phys. 6	Elec., Mag. & Heat	3	Math. 5	Inter. Calculus..	3	Math. 5	Inter. Calculus..	3
Phys. 7	Physics Lab. ...	1	M.E. 23	Heat Engines...	3	M.E. 23	Heat Engines...	3
Mil. 3	M. S. & T.	2	Phys. 4	Mech., Light, & Sound	3	Phys. 4	Mech., Light, & Sound	3
E.C. 3	Eng. Conferences	—	Phys. 5	Physics Lab. ...	1	Phys. 5	Physics Lab. ...	1
P.E. 3	Physical Ed. ...	—	Mil. 4	M. S. & T.	2	Mil. 4	M. S. & T.	2
*Chap. 3	Chapel	—	E.C. 4	Eng. Conferences	—	E.C. 4	Eng. Conferences	—
			P.E. 4	Physical Ed. ...	—	P.E. 4	Physical Ed. ...	—
			*Chap. 4	Chapel	—	*Chap. 4	Chapel	—
		19			19			19

SUMMER

Chem. 39 ... Assaying, Coal, Gas, and Oil Analysis..... 4

FIRST SEMESTER			JUNIOR YEAR			SECOND SEMESTER		
Bus. 3	Economics	3	Bus. 4	Economics	3	Bus. 4	Economics	3
C.E. 9	Mech. of Materials	3	C.E. 13	Hydraulics	2	C.E. 13	Hydraulics	2
C.E. 10	Mat. Testing Lab.	1	C.E. 14	Hydraulics Lab.	1	C.E. 14	Hydraulics Lab.	1
Geol. 112	Petrography	2	Engl. 41 or 42	English	3	Engl. 41 or 42	English	3
Mine. 1	Mining Eng.	3	Met. 21	Metallurgy	2	Met. 21	Metallurgy	2
Mine. 2	Mining Methods.	3	Met. 81	Met. Problems..	1	Met. 81	Met. Problems..	1
Mine. 3	Ore Dress., Coal Prep. & Lab...	3	Mine. 5	Mining Eng.	3	Mine. 5	Mining Eng.	3
P.E. 5	Physical Ed. ...	—	Mine. 6	Mine Surveying..	3	Mine. 6	Mine Surveying..	3
		18	P.E. 6	Physical Ed. ...	—	P.E. 6	Physical Ed. ...	—
		18			18			18

SUMMER

Mine. 20 ... Industrial Employment
 Mil. 9 or 19... or Reserve Officers' Training Corps Camp... 3

FIRST SEMESTER			SENIOR YEAR			SECOND SEMESTER		
C.E. 20	Graphic Statics..	2	E.E. 52	Alt. Currents...	2	E.E. 52	Alt. Currents...	2
E.E. 50	Dyn. & Motors...	2	E.E. 53	Dynamo Lab....	1	E.E. 53	Dynamo Lab....	1
E.E. 51	Dynamo Lab....	1	Geol. 108	Economic Geology	3	Geol. 108	Economic Geology	3
Geol. 7	Economic Geology	2	Mine. 8	Oil Field Prac...	2	Mine. 8	Oil Field Prac...	2
Ten credit hours from following:			Nine credit hours from following:					
Biol. 52	Sanitary Bac. 3	10	Bus. 18	Accounting ... 3	9	Bus. 18	Accounting ... 3	
Bus. 25	Corp. Finance. 3		Bus. 56	Bus. Law... 3		Bus. 56	Bus. Law... 3	
C.E. 125	Reinf. Con... 3		C.E. 16	Highway Eng. 3		C.E. 16	Highway Eng. 3	
C.E. 126	Cement Lab... 1		C.E. 30	Str. Steel Des. 3		C.E. 30	Str. Steel Des. 3	
Geol. 111	Field Geol... 2		Geol. 110	Stratig. Geol. 2		Geol. 110	Stratig. Geol. 2	
Geol. 115	Geol. Method. 1		Geol. 115	Geol. Method. 1		Geol. 115	Geol. Method. 1	
I.E. 2	Ind. Man... 3		I.E. 3	Ind. Man... 3		I.E. 3	Ind. Man... 3	
M.E. 21	Engine Lab... 1		M.E. 25	Engine Lab... 1		M.E. 25	Engine Lab... 1	
Met. 3	Metallurgy ... 2		Met. 4	Metallurgy ... 2		Met. 4	Metallurgy ... 2	
Met. 25	Electrochem. 2		Mine. 9	Mine Adm. ... 1		Mine. 9	Mine Adm. ... 1	
Mine. 7	Construction 2		Mine. 11	Fuel Tech... 2		Mine. 11	Fuel Tech... 2	
Mine. 10	Fuel Tech... 2		Span. 2 or 12	Spanish ... 3		Span. 2 or 12	Spanish ... 3	
Span. 1 or 11	Spanish ... 3		P.E. 8	Physical Ed. ...	—	P.E. 8	Physical Ed. ...	—
P.E. 7	Physical Ed. ...	—			17			17

* Taken by students who elect Chap. 1 and 2 during freshman year.

DESCRIPTION OF COURSES

Following is a list of the undergraduate and graduate courses offered by Lehigh University. The number of exercises a week in each subject is indicated by the figures in parentheses. Three hours of drawing, of work in the laboratory, or of practice in the field are regarded as equivalent to a recitation or lecture of one hour's duration.

ASTRONOMY

See Mathematics and Astronomy

BIOLOGY

PROFESSORS HALL AND THOMAS, MESSRS. FARRELL AND TREMBLEY

Biol. 1. BIOLOGY. Lectures, written recitations, laboratory work. The lectures deal with the following topics: (1) fundamental conceptions: life, protoplasm, the cell, etc.; (2) the more important biological theories: variation, heredity, evolution, etc. In the laboratory, types of the various phyla are dissected and drawings made. Fee, \$3.00. First semester (3).

Biol. 2. MAMMALIAN ANATOMY. Two laboratory periods, the work consisting of the detailed dissection of a mammal. Prerequisite: Biol. 1. Fee, \$5.00. Second semester (2).

Biol. 3. COMPARATIVE ANATOMY OF VERTEBRATES. Text-book work and recitations on the comparative anatomy of vertebrates; laboratory work consisting of the dissection of types of the several vertebrate classes. Prerequisite: Biol. 1. Fee, \$3.00. Second semester (3).

Biol. 4. VERTEBRATE EMBRYOLOGY. Lectures, text-book, and laboratory work. Study of living, preserved, and sectioned material demonstrating the successive stages of cleavage, gastrulation, and the formation of organs. Prerequisite: Biol. 1 and, preferably, Biol. 3. First semester (3).

Biol. 5. PHYSIOLOGY. A course in normal physiology, hygiene, and sanitation aiming to give that knowledge of the body and its functions which all should have. Emphasis on the application of such knowledge to personal hygiene and public sanitation. First semester (2).

Biol. 6. BOTANY. A survey of the subject designed to give the student a general knowledge of plant life, morphology, physiology, and the classification of the vegetable kingdom. Type species studied in the laboratory and field trips to familiarize the student with plant habitats. Second semester (3).

Biol. 7. ELEMENTARY BIOLOGY. A course dealing with the characteristics and the history of living organisms. Biol. 7 and Biol. 8 form a continuous course and should not be taken separately. First semester (3).

Biol. 8. ELEMENTARY BIOLOGY. Continuation of Biol. 7. Second semester (3).

Biol. 9. GENETICS. The laws and the mechanism of heredity; eugenics. Prerequisite: Biol. 1. Second semester (1).

Biol. 15. FRESHMAN HYGIENE. A course of six lectures on personal and social hygiene, with the cooperation of the Director of the Students' Health Service. This course is given during Freshman Week and must be passed by all freshmen.

Biol. 16. SOCIAL HYGIENE. A course for students who for any reason have not taken or have not passed Biol. 15. Second semester.

Biol. 50. SANITARY BACTERIOLOGY. Study of bacteria and allied microorganisms by staining and cultural methods; their sanitary importance in public water supplies; the bacteriology of sewage and sewage treatment; qualitative and quantitative bacteriological and biological analysis of water and sewage. Lectures, recitations, and laboratory work. Fee, \$3.00. Second semester (3).

Biol. 52. BACTERIOLOGY. An elementary course in general bacteriology. A general study of the morphological and cultural characteristics of bacteria and allied microorganisms; special attention given to those forms of sanitary and economic importance; the role of bacteria, yeasts, and molds in fermentation industries, in the soil, and in disease. Lectures, recitations, and laboratory work. Fee, \$3.00. First semester (3).

Biol. 54. BACTERIOLOGY. A course in elementary bacteriology for pre-medical students and others specializing in biological sciences. Laboratory work including special staining methods

in the study of morphology; differential media in the study of bacterial physiology; and in general a more thorough study of the microorganisms themselves rather than their specific sanitary or industrial importance. Recitations, lectures, and laboratory work. Fee, \$3.00. First semester (3).

For Advanced Undergraduates and Graduates

Biol. 112. HISTOLOGY AND MICROSCOPICAL TECHNIQUE. Two laboratory periods of three hours each. Second semester (2).

Biol. 153. ADVANCED BACTERIOLOGY. A laboratory and seminar course in advanced laboratory technique; a thorough cultural study of the more common pathogenic bacteria; bacteriological laboratory diagnosis of pathological fluids. Prerequisites: Biol. 51, 52, or 54. Fee, \$3.00. Second semester (3).

Biol. 158. IMMUNOLOGY. A comprehensive recitation course in the history of the study of immunity and modern theories concerning its mechanism. Prerequisite: Biol. 50 (or 52 or 54). Biol. 153 desirable either previously or concurrently. Second semester (3).

For Graduates

Prerequisite for graduate work in Biology: the amount of biology usually obtained by an undergraduate majoring in that department. Prerequisite for graduate work in Bacteriology: a satisfactory course in undergraduate bacteriology and a sufficient preparation in organic chemistry.

Biol. 203. VERTEBRATE HISTOGENESIS AND ORGANOGENESIS. Careful following, in the laboratory, of the development of a vertebrate; tracing of the history of the germ-layers, organs, and tissues; organogenesis dealing with the association of tissues to form organs. First semester (3). Professor Hall.

Biol. 205. HISTORY OF BIOLOGY. A course based on reading, seminars, and written reports. First or second semester (2). Professor Hall.

Biol. 206. BIOLOGICAL THEORIES. A course dealing especially with genetics. First or second semester (2). Professor Hall.

Biol. 207. BIOLOGICAL RESEARCH. In this course a student may pursue investigations in such subjects as embryology,

comparative anatomy, genetics, etc., according to his preparation and interests. First semester (3). Professor Hall.

Biol. 208. BIOLOGICAL RESEARCH. Continuation of Biol. 207. Second semester (3). Professor Hall.

Biol. 251. BACTERIOLOGICAL RESEARCH. In this course competent graduate students are given laboratory problems to be worked out under the supervision of the Professor of Bacteriology. Prerequisites: Biol. 50 (or 52 or 54) and 153 and at least one semester of organic chemistry. First semester (3). Professor Thomas.

Biol. 252. BACTERIOLOGICAL RESEARCH. Continuation of Biol. 251. Second semester (3). Professor Thomas.

Biol. 253. BACTERIOLOGICAL RESEARCH. May be taken simultaneously with Biol. 251 by graduate students majoring in Bacteriology. First semester (2). Professor Thomas.

Biol. 254. BACTERIOLOGICAL RESEARCH. May be taken simultaneously with Biol. 252 by graduate students majoring in Bacteriology. Biol. 253 and 254 are given only to graduate students who are majoring in Bacteriology. Biol. 251 and its continuation, Biol. 252, may be taken by graduate students minoring in Bacteriology. Second semester (2). Professor Thomas.

Biol. 255. INDUSTRIAL BACTERIOLOGY. An advanced course in bacteriology including aspects of industrial chemistry in which bacteria play an essential part in the process, as in the manufacture of acetone, butyl alcohol, acetic and lactic acids, etc. A study of the common contaminating organisms which cause commercial losses in the manufacture of sugar, leather, etc. Prerequisite: Biol. 52 or 54. First semester (3). Professor Thomas.

Biol. 257. ADVANCED PUBLIC SANITATION. A study of the biological, chemical, bacteriological, and physical aspects of public water supplies. Prerequisites: Biol. 51, 52, or 54 and at least two years of chemistry, including quantitative analysis. First or second semester (1). Professor Thomas.

Biol. 258. ADVANCED PUBLIC SANITATION. Similar to Biol. 257, dealing with systems of sewage disposal. Prerequisites:

same as for Biol. 257. First or second semester (1). Professor Thomas.

Biol. 259. ADVANCED PUBLIC SANITATION. Similar to Biol. 257, dealing with milk distribution. Prerequisites: same as for Biol. 257. First or second semester (1). Professor Thomas.

Biol. 260. SEROLOGY. A laboratory course in the preparation of antigens, immunization of animals, and the study of immune products such as agglutinins, precipitins, bacteriotropins, lysins, etc. To be taken by graduate students simultaneously with or following Biol. 158. Prerequisites: same as for Biol. 158. First or second semester (3). Professor Thomas.

BUSINESS ADMINISTRATION

PROFESSORS CAROTHERS, COWIN, AND DIAMOND,
ASSOCIATE PROFESSOR BRADFORD, ASSISTANT PROFESSORS
BISHOP, BRATT, HARING, AND ALLEN, MESSRS. MEAD AND PAYNE

Bus. 1. INDUSTRIAL EVOLUTION. An introductory course outlining the gradual development of economic organization, with special attention to the stages of economic progress and social institutions growing out of these stages. First semester (3).

Bus. 2. INDUSTRIAL EVOLUTION. Continuation of Bus. 1, with special emphasis on the Industrial Revolution, the economic history of the United States, and modern industrial enterprises in America. Second semester (3).

Bus. 3. ECONOMICS. A general course in the principles of economics, covering the fundamental forces governing the production, distribution, and consumption of wealth, with emphasis on value, exchange, money, rent, interest, profits, and wages. Prerequisite: sophomore standing. First semester (3).

Bus. 4. ECONOMICS. Continuation of Bus. 3. Second semester (3).

Bus. 11. ACCOUNTING. A study of the elementary principles of accounting, with sufficient practical work to develop a knowledge of accounting practice; theories of debit and credit; construction of accounts; partnership and corporation accounts; financial statements. First semester (3).

Bus. 12. ACCOUNTING. Continuation of Bus. 11. Second semester (3).

Bus. 15. COST ACCOUNTING. A study of the methods used by manufacturing and commercial enterprises in ascertaining, recording, and controlling costs. Prerequisites: Bus. 11 and 12 or Bus. 18. First semester (3).

Bus. 16. ACCOUNTING SYSTEMS. A special study of various systems of accounts, with emphasis on cost accounting and production control. Prerequisites: Bus. 11 and 12 or Bus. 18. Second semester (3).

Bus. 18. ACCOUNTING FOR ENGINEERS. An intensive course in the principles and practice of accounting, covering the fundamentals in one semester. Especially designed for engineering students. Second semester (3).

Bus. 21. CORPORATION FINANCE. An outline of the methods of corporations in obtaining capital, issuing securities, and extinguishing debts, with attention to the rights and obligations of security holders and to problems of corporation insolvency and dissolution. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 22. CORPORATION FINANCE. Continuation of Bus. 21. Second semester (3).

Bus. 25. CORPORATION FINANCE. An intensive course covering the fundamentals of corporation finance in one semester. Especially designed for engineering students. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 29. MONEY AND BANKING. A study of the nature of money and the principles of banking, with emphasis on coinage systems, monetary standards, paper currency, the economic functions of banks, bank-note issue, various banking systems, and the Federal Reserve System. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 30. MONEY AND BANKING. Continuation of Bus. 29. Second semester (3).

Bus. 33. LABOR PROBLEMS. A course in the economics of labor, with special reference to the history of labor movements in the United States, forms of labor organizations, and the

methods and policies of trades unions. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 34. LABOR PROBLEMS. Continuation of Bus. 33, with emphasis on the problems of the employer; employers' associations; profit-sharing; welfare work; and social insurance. Second semester (3).

Bus. 35. PUBLIC UTILITIES. A course in the economics of transportation, with special reference to railways. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 36. PUBLIC UTILITIES. Continuation of Bus. 35, with emphasis on the economics of the public utilities that supply electric light, gas, water, power, and communication services. Second semester (3).

Bus. 45. STATISTICS. A study of the methods of statistical description and induction, including tabular and graphic analysis and presentation. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 46. BUSINESS CYCLES AND FORECASTING. A course dealing with the nature of the business cycle and the application of statistics to business trends, with special attention to forecasting and business barometers. Prerequisite: Bus. 45. Second semester (3).

Bus. 49. ECONOMIC GEOGRAPHY. A survey of the geographic factors determining economic development, with special reference to the chief economic materials and to the geographic influences responsible for the economic history and the economic position of the United States. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 50. ECONOMIC GEOGRAPHY. Continuation of Bus. 49. Second semester (3).

Bus. 56. BUSINESS LAW. An intensive one-semester course in the essentials of business law. Prerequisites: Bus. 3 and 4. Second semester (3).

Bus. 57. MARKETING. A course dealing with the distribution of economic goods, with emphasis on the chief agencies of distribution, marketing practice, and the produce exchanges. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 58. ADVERTISING AND SELLING. Continuation of Bus. 57, dealing with the principles and the problems of advertising, sales management, and special methods of selling. Prerequisite: Bus. 57. Second semester (3).

For Advanced Undergraduates and Graduates

Bus. 107. ADVANCED ECONOMICS. An advanced course in the principles of economics, dealing especially with the theory of the distribution of wealth, the nature of the productive process, the history of economic doctrines, and proposed plans of economic reform such as socialism. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 108. ADVANCED ECONOMICS. Continuation of Bus. 107. Second semester (3).

Bus. 113. ADVANCED ACCOUNTING. Advanced work in the field of accounting, with emphasis on the problems of assets valuation, corporation accounts, liquidations, and consolidations. Prerequisites: Bus. 11 and 12 or Bus. 18. First semester (3).

Bus. 114. ACCOUNTING THEORY. A critical examination of the fundamental principles upon which accounting practice is based, with a consideration of some special relationships between economics and accounting involved in problems of valuation, income and capital charges, and taxation. Prerequisites: Bus. 11 and 12 or Bus. 18. Second semester (3).

Bus. 123. INVESTMENTS. A one-semester course which makes a detailed study, from the standpoint of the investor, of the various types of corporation and government securities, with special reference to owners' equities, comparative yields, and the machinery of investment, including stock exchange operations. Prerequisites: Bus. 21 and 22. First semester (3).

Bus. 126. PUBLIC FINANCE. A one-semester course dealing with government expenditures and revenues, public debts and taxation, with emphasis on the economics and the administration of federal and state taxes. Prerequisites: Bus. 3 and 4. Second semester (3).

Bus. 131. BANKING POLICIES. A course in American banking problems, with emphasis on Federal Reserve policy, operation problems of banks, and regulation. Prerequisites: Bus. 29 and 30. First semester (3).

Bus. 132. MONEY MARKETS. Continuation of Bus. 131, dealing with the phenomena of money markets, American and European, including discount and credit conditions, foreign exchange, and international banking. Second semester (3).

Bus. 161. SOCIOLOGY. A study of the nature and the growth of social institutions, with emphasis on evolution, racial development, social stratification, and the social problems connected with the institutions of private property, family organization, and sex. Prerequisites: Bus. 3 and 4. First semester (3).

Bus. 162. SOCIOLOGY. Continuation of Bus. 161. Second semester (3).

CHEMISTRY AND CHEMICAL ENGINEERING

PROFESSORS ULLMAN, BABASINIAN, LONG, AND DIEFENDERFER,
ASSOCIATE PROFESSORS EWING, ANDERSON, NEVILLE, AND THEIS,
ASSISTANT PROFESSORS BECK, BILLINGER, AND HAZLEHURST,
MESSRS. SMULL, J. M. MILLER, DE GRAY, WILLIAMS,
FRANTZ, AND W. S. MILLER

Chem. 1. ELEMENTARY CHEMISTRY. Elementary phenomena and principles of chemistry. Lectures illustrated by experiments, diagrams, working drawings, and specimens from the museum. Each semester (2).

Chem. 3. INTERMEDIATE CHEMISTRY. A course for students who pass the examination in elementary chemistry held during Freshman Week. Prerequisite: satisfactory preparation in the rudiments of chemistry. First semester (2).

Chem. 6. ADVANCED CHEMISTRY. Inorganic chemistry. Lecture course with recitations. Theories of chemistry; physical and chemical methods of determining atomic and molecular weights, thermo-chemistry, dissociation, solution, catalysis, electrolysis, radio-activity, non-metallic elements and their compounds. Prerequisites: Chem. 1 and 11, or 3 and 13; 8 and 20. First semester (3).

Chem. 7. ADVANCED CHEMISTRY. Inorganic chemistry. Continuation of Chem. 6. Lecture course with recitations. Electronics, atom structure and phase rule, solid solutions, metallic elements and their compounds and alloys. Readings in original

literature. Prerequisites: Chem. 1 and 11, or 3 and 13; 8 and 20. Second semester (3).

Chem. 8. STOICHIOMETRY. Chemical problems and reactions. Second semester (1).

Chem. 11. CHEMISTRY LABORATORY. Experiments covering a systematic study of the chemical and physical properties of the more important elements and their compounds. Deposit, \$15.00. Each semester (2).

Chem. 12. CHEMISTRY LABORATORY. Primarily for Arts and Science and Business Administration students. An abridgment of Chem. 11. Deposit, \$15.00. First semester (1).

Chem. 13. CHEMISTRY LABORATORY. Experiments designed to accompany Chem. 3. Prerequisite: satisfactory preparation in the rudiments of laboratory chemistry. Deposit, \$15.00. First semester (2).

Chem. 14. CHEMISTRY LABORATORY. Primarily for Arts and Science and Business Administration students. An abridgment of Chem. 13. Deposit, \$15.00. First semester (1).

Chem. 20. QUALITATIVE ANALYSIS. Metals and their industrially interesting compounds. The fundamental scientific principles and the practice of qualitative analysis methods. Accompanied by lectures and demonstrations. Deposit, \$25.00. Second semester (3).

Chem. 21. QUALITATIVE ANALYSIS. Similar to Chem. 20 but shorter. Deposit, \$25.00. Second semester (2).

Chem. 30. QUANTITATIVE ANALYSIS. Practical work in the quantitative laboratory, accompanied by lectures and recitations; an introduction to gravimetric analytic method and typical fundamental volumetric processes. Prerequisites: Chem. 1 and 11, or 3 and 13; 20 or 21. Deposit, \$30.00. First semester (3).

Chem. 31. QUANTITATIVE ANALYSIS. Continuation of Chem. 30. Analysis of metallic products, ores and alloys of industrial interest chosen to represent the application of quantitative chemical principles to analysis. Deposit, \$30.00. Second semester (3).

Chem. 33. QUANTITATIVE ANALYSIS. Practical work in the quantitative laboratory. Analysis of simple chemical compounds, ores, and metallurgical products. Prerequisites: Chem. 1 and 11, or 3 and 13; 20 or 21. Deposit, \$25.00. First semester (3).

Chem. 36. QUANTITATIVE ANALYSIS. Practical work in the quantitative laboratory. Analysis of simple chemical compounds. Prerequisites: Chem. 1 and 11, or 3 and 13; 20 or 21. Deposit, \$25.00. First semester (2).

Chem. 37. QUANTITATIVE ANALYSIS. Continuation of Chem. 36. Deposit, \$30.00. Second semester (2).

Chem. 39. ASSAYING, COAL, GAS, AND OIL ANALYSIS. Lectures and laboratory practice in the furnace assay of the ores of lead, gold, and silver, and of gold and silver bullion; cyanidization; calculations for slags and slag mixtures; laboratory practice and class-room discussion of the analysis of boiler water, mine water, coal, coke, tar, gas, petroleum, and petroleum products; colorimetry. Prerequisites: Chem. 8, and 30, 33, or 36. Deposit, \$30.00. Summer session: a lecture and seven hours of laboratory work each week-day for four weeks, beginning June 1, 1931. Tuition fee, \$40.00 (4).

Chem. 41. QUANTITATIVE ANALYSIS CONFERENCE. Lectures and recitations concerning the scientific foundations and laboratory practice of Chem. 30. Prerequisites: Chem. 1 and 11, or 3 and 13; 20 or 21. First semester (1).

Chem. 44. QUANTITATIVE ANALYSIS CONFERENCE. Lectures and recitations pertaining to the laboratory work of Chem. 33. Prerequisites: Chem. 1 and 11, or 3 and 13; 20 or 21. First semester (1).

Chem. 45. QUANTITATIVE ANALYSIS CONFERENCE. Continuation of Chem. 41. Lectures and recitations to accompany Chem. 31. Second semester (1).

CHEM. 48. QUANTITATIVE ANALYSIS CONFERENCE. Lectures and recitations to accompany Chem. 36. First semester (1).

Chem. 49. QUANTITATIVE ANALYSIS CONFERENCE. Lectures and recitations to accompany Chem. 37. Second semester (1).

Chem. 50. SUMMER WORK. During the summer following the junior year students in the curriculum in Chemistry are required to gather industrial experience by at least eight weeks' work in industrial shops or laboratories.

Chem. 78. CHEMICAL ENGINEERING. An introduction to chemical engineering reviewing a number of industrial processes mainly in their engineering aspects; hydrostatics and pneumatics. Prerequisites: Math. 4, Chem. 6, 30, and 41. First semester (3).

Chem. 98. PHYSICAL CHEMISTRY. An abridgment of Chem. 190 and 191 for students in the curriculum in Metallurgical Engineering. Prerequisites: Math. 5, Chem. 6 and 33. Second semester (2).

Chem. 99. RESEARCH CHEMISTRY LABORATORY. Advanced stage of study or an investigation approved by the Professor of Chemistry of some novel problem, involving exhaustive laboratory and library study. Deposit, \$15.00. Second semester (2).

Deposit to cover breakage, chemicals, etc., are required as indicated above. The unused portion of the deposit is returned to the student.

For Advanced Undergraduates and Graduates

Chem. 138. INDUSTRIAL ORGANIC ANALYSIS. A laboratory study of special operations in quantitative analytical chemistry as applied to organic compounds of industrial importance; the chemical analysis of drinking water and of milk are included in this course. Prerequisites: Chem. 31 or 35, and 160. Deposit, \$35.00. Second semester (3).

Chem. 147. INDUSTRIAL ANALYSIS CONFERENCE. Conferences on the principles and the applications of the laboratory methods of industrial organic analysis of Chem. 138. Prerequisites: Chem. 45 and 160. Second semester (1).

Chem. 160. ORGANIC CHEMISTRY. Lectures and recitations. A systematic survey of the typical compounds of carbon; their classification and general relations; study of synthetic reactions. Prerequisites: Chem. 1 and 11, or 3 and 13; 20 or 21; 30 or 33. First semester (4).

Chem. 161. ORGANIC CHEMISTRY. Continuation of Chem. 160. Second semester (3).

Chem. 162. ADVANCED ORGANIC CHEMISTRY. An advanced course in certain theories of organic chemistry. Prerequisites: Chem. 160, 165, 161, and 166, with high grades. Given in alternate years. Not given in 1930-1931. First semester (2).

Chem. 163. CHEMISTRY OF DRUGS, DYES, AND RELATED COMPOUNDS. Prerequisites: Chem. 160, 165, 161, and 166 with high grades. Given in alternate years. Not given in 1931-1932. First semester (2).

Chem. 165. ORGANIC CHEMISTRY LABORATORY. Determinations of specific gravities, melting points, boiling points, vapor densities; qualitative and quantitative determinations of carbon, hydrogen, nitrogen, and the halogens; preparation of pure organic compounds. Prerequisites: Chem. 1 and 11, or 3 and 13; 20 or 21; 30 or 33. Deposit, \$30.00. First semester (2).

Chem. 166. ORGANIC CHEMISTRY LABORATORY. Continuation of Chem. 165. Practical methods of saturation, nitration, reduction, diazotization, sulphonation, etc.; preparation of pure compounds; study of the properties of dyes and other commercial products. Deposit, \$40.00. Second semester (3).

Chem. 167. ORGANIC CHEMISTRY LABORATORY. Similar to Chem. 166 but shorter. Deposit, \$40.00. Second semester (2).

Chem. 168. INDUSTRIAL BIOCHEMISTRY. The inorganic, organic, and physical chemistry of life processes and their products. Atomic and molecular structure, equilibria, colloidal state, catalysis, osmosis, synthesis, oxidation, and reduction as applying to carbohydrates, proteins, fats, lipoids, and their interrelations. Prerequisites: Chem. 160 and 165. This course may be taken without Chem. 169. First semester (2).

Chem. 169. INDUSTRIAL BIOCHEMISTRY LABORATORY. Laboratory work to accompany Chem. 168. Prerequisites: Chem. 160 and 165. Deposit, \$15.00. First semester (1).

Chem. 179. HISTORY OF CHEMISTRY. Chronological development of the science, with assigned reading. Prerequisites: Chem. 7 and 161. Second semester (1).

Chem. 180. **CHEMICAL ENGINEERING LABORATORY.** Engineering fundamentals, including machinery and materials of chemical plants; transportation in plant of gases, liquids, and solids, grinding, pulverizing, screening, centrifuging, fuels, and combustion engineering; lay out and cost data of a simple manufacturing plant; laboratory work including study of some of these fundamentals. Visits to industrial plants for inspection of large units are an integral part of the course. Prerequisites: Chem. 31, 45, 78, 160, and 165. Deposit, \$25.00. First semester (3).

Chem. 181. **CHEMICAL ENGINEERING.** Continuation of Chem. 180. Discussion of unit engineering procedure. Processes considered: filtration, sedimentation, electric and magnetic separation, solution, stirring, mixing, crystallization, drying, evaporation, distillation, calculations of engineering design. Assigned reading in industrial chemistry and visits to industrial plants are incidental to the course. Second semester (3).

Chem. 185. **CHEMICAL ENGINEERING PRACTICE.** Comprehensive studies in nearby manufacturing plants of a few processes involving one or more unit engineering operations, these studies usually occupying time covering whole days or multiples thereof. Deposit, \$10.00. Second semester (1).

Chem. 190. **PHYSICAL CHEMISTRY.** Lectures and recitations. Prerequisites: Math. 5, Chem. 7, and 31 or 35. First semester (3).

Chem. 191. **PHYSICAL CHEMISTRY.** Continuation of Chem. 190. Second semester (2).

Chem. 192. **ELECTROCHEMISTRY.** Chemical reactions in gases, solutions, and molten electrolytes caused by the electric current. Quantitative relations between electromotive force, electrical energy, and chemical energy. Efficiency and applicability of typical processes. Prerequisites: Math. 5, Chem. 7, and 31 or 35. First semester (1).

Chem. 195. **PHYSICAL CHEMISTRY LABORATORY.** Physical chemical measurements. Prerequisites: Math. 5, Chem. 7, and 31 or 35. Deposit, \$10.00. First semester (1).

Chem. 196. **PHYSICAL CHEMISTRY LABORATORY.** Continuation of Chem. 195. Deposit, \$10.00. Second semester (1).

Chem. 197. ELECTROCHEMISTRY LABORATORY. Experimental study of electrochemical reactions. Current efficiencies, electromotive force measurements and overvoltage; transport numbers; electrochemical preparations. Prerequisites: Math. 5, Chem. 7, and 31 or 35. Deposit, \$5.00. First semester (1).

For Graduates

The prerequisites for graduate work in Chemistry as a major study are: Inorganic Chemistry (8), Qualitative Analysis (4), Quantitative Analysis (8), Organic Chemistry (10), Physical Chemistry (5), Physics (12), and Mathematics, including Calculus, (12). Students of exceptional ability may be able to make up minor deficiencies while carrying graduate work. If the deficiencies are serious, a student can hardly expect to complete the requirements for the Master's degree within the minimum time.

Chem. 200. INORGANIC CHEMISTRY RESEARCH. Investigation in the field of inorganic chemistry and in drying oils and their metallic salts. Prerequisites as in the statement above introductory to graduate courses. Deposit, \$30.00. First semester (4). Professor Long, Associate Professor Neville.

Chem. 201. INORGANIC CHEMISTRY RESEARCH. Continuation of Chem. 200. Deposit, \$30.00. Second semester (4). Professor Long, Associate Professor Neville.

Chem. 202. ADVANCED INORGANIC CHEMISTRY. A course of conference and reading in the generalizations of inorganic chemistry. Prerequisites as in the statement above introductory to graduate courses and a reading knowledge of German and French. First semester (2). Professor Long, Associate Professor Neville.

Chem. 203. ADVANCED INORGANIC CHEMISTRY. Continuation of Chem. 202. Second semester (2). Professor Long, Associate Professor Neville.

Chem. 230. QUANTITATIVE ANALYSIS RESEARCH. Investigation of problems in analytic procedures. Prerequisites as in the statement above introductory to graduate courses. Deposit, \$30.00. First semester (4). Professor Ullmann, Professor Diefenderfer.

Chem. 231. QUANTITATIVE ANALYSIS RESEARCH. Continuation of Chem. 230. Deposit, \$30.00. Second semester (4). Professor Ullmann, Professor Diefenderfer.

Chem. 234. RADIATION METHODS. The application of radiation methods, mainly X-ray methods, to chemical and industrial chemical problems. First semester (2). Associate Professor Anderson.

Chem. 235. RADIATION METHODS. Continuation of Chem. 234. Second semester (2). Associate Professor Anderson.

Chem. 244. RADIATION METHODS LABORATORY. Laboratory practice in connection with Chem. 234. Deposit, \$10.00. First semester (1). Associate Professor Anderson.

Chem. 245. RADIATION METHODS LABORATORY. Continuation of Chem. 244. Deposit, \$10.00. Second semester (1). Associate Professor Anderson.

Chem. 260. ORGANIC CHEMISTRY RESEARCH. Investigation of a problem in organic chemistry with particular reference to the dye industry. Prerequisite: a course substantially equivalent to Chem. 161 and 165. Deposit, \$30.00. First semester (4). Professor Babasinian.

Chem. 261. ORGANIC CHEMISTRY RESEARCH. Continuation of Chem. 260. Deposit, \$30.00. Second semester (4). Professor Babasinian.

Chem. 265. ADVANCED ORGANIC PREPARATIONS. Mainly a laboratory course. Prerequisite: Chem. 165. Deposit, \$30.00. First semester (2). Professor Babasinian.

Chem. 266. ADVANCED ORGANIC PREPARATIONS. Continuation of Chem. 265. Deposit, \$30.00. Second semester (2). Professor Babasinian.

Chem. 280. INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING RESEARCH. Investigation of a problem in chemical engineering or in industrial chemistry. Prerequisites: for problems in industrial chemistry as in the statement above introductory to graduate courses; for investigation of a problem in chemical engineering, an undergraduate curriculum in chemical engineering substantially equivalent to the curriculum in

this University. Deposit, \$30.00. First semester (4). Professor Ullmann, Associate Professor Theis, Assistant Professor Simmons, Assistant Professor Billinger.

Chem. 281. INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING RESEARCH. Continuation of Chem. 280. Deposit, \$30.00. Second semester (4). Professor Ullmann, Associate Professor Theis, Assistant Professor Simmons, Assistant Professor Billinger.

Chem. 282. CHEMICAL ENGINEERING. Advanced consideration of chemical engineering energetics, hydrodynamics, and heat transfer applied to evaporation, distillation, crystallization, filtration, combustion, and refrigeration. A portion of these are carried in Chem. 283. Prerequisites: courses substantially equivalent to the undergraduate curriculum in chemical engineering in this University. First semester (3). Associate Professor Theis, Assistant Professor Simmons.

Chem. 283. CHEMICAL ENGINEERING. Continuation of Chem. 282. Second semester (3). Associate Professor Theis, Assistant Professor Simmons.

Chem. 284. TANNING TECHNOLOGY. Special development of inorganic, organic, and physical chemistry and allied sciences as applied to control and research in tanning and in the manufacture of leather. Principles of design and operation of apparatus and machinery of the leather industry. Prerequisites as in statement above introductory to graduate courses. First semester (3). Associate Professor Theis.

Chem. 285. TANNING TECHNOLOGY. Continuation of Chem. 284. Second semester (3). Associate Professor Theis.

Chem. 286. TANNING ENGINEERING PRACTICE. A laboratory course to accompany Chem. 284. Experimental scientific studies in a small tannery of modern design of the major tanning and leather finishing processes. Visits to and studies in industrial tanneries. Deposit, \$30.00. First semester (3). Associate Professor Theis.

Chem. 287. TANNING ENGINEERING PRACTICE. Continuation of Chem. 286. Deposit, \$30.00. Second semester (3). Associate Professor Theis.

Chem. 288. CHEMICAL ENGINEERING PROCESS DESIGN. The applications of chemical engineering principles in the design of unit process equipment and the coordination of such units into organized production. Problems involving such processes as evaporation, distillation, drying, filtration, absorption, etc., will be investigated in the laboratory, in the drafting room, and in operating plants. Prerequisites: courses substantially equivalent to the undergraduate curriculum in chemical engineering in this University. Deposit, \$30.00. First semester (3). Associate Professor Theis, Assistant Professor Simmons.

Chem. 289. CHEMICAL ENGINEERING PROCESS DESIGN. Continuation of Chem. 288. Deposit, \$30.00. Second semester (3). Associate Professor Theis, Assistant Professor Simmons.

Chem. 290. PHYSICAL CHEMISTRY RESEARCH. Investigation of a problem in physical chemistry; vapor pressure and calorimetric studies in the constitution of inorganic salts. Prerequisites: the equivalent of Chem. 190, 191, 195, and 196. Deposit, \$30.00. First semester (4). Associate Professor Ewing.

Chem. 291. PHYSICAL CHEMISTRY RESEARCH. Continuation of Chem. 290. Deposit, \$30.00. Second semester (4). Associate Professor Ewing.

Chem. 292. THEORETICAL CHEMISTRY: KINETICS. Prerequisites: a good working knowledge of mathematics and the equivalent of Chem. 190, 191, 195, and 196. Given in alternate years. Not given in 1930-1931. First semester (3). Assistant Professor Hazlehurst.

Chem. 293. THEORETICAL CHEMISTRY: KINETICS. Continuation of Chem. 292. Second semester (3). Assistant Professor Hazlehurst.

Chem. 294. THEORETICAL CHEMISTRY: THERMODYNAMICS. Prerequisites: a good working knowledge of mathematics and the equivalent of Chem. 190, 191, 195, and 196. Given in alternate years. Not given in 1931-1932. First semester (3). Assistant Professor Hazlehurst.

Chem. 295. THEORETICAL CHEMISTRY: THERMODYNAMICS. Continuation of Chem. 294. Second semester (3). Assistant Professor Hazlehurst.

Chem. 296. COLLOIDS. Theories and applications of colloidal behaviour. Lectures and seminar with occasional demonstrations. Prerequisites as in statement introductory to graduate courses. First semester (3). Associate Professor Neville.

Chem. 297. CATALYSIS. Theories of catalytic mechanism. Preparation, activation, and control of catalysis. The applications of catalysis in various types of chemical reactions and in certain industrial processes. Lectures, seminar, demonstrations. Prerequisites as in statement above introductory to graduate courses. Second semester (3). Associate Professor Neville.

Chem. 298. ADVANCED PHYSICAL CHEMISTRY. A course arranged to go forward from courses in elementary physical chemistry. Collateral reading required. Prerequisites as in the statement above introductory to graduate courses. Second semester (3). Associate Professor Ewing.

Chem. 299. PHYSICAL CHEMISTRY METHODS. Advanced course in methods of physical chemistry laboratory practice. Prerequisites: the equivalent of Chem. 195 and 196. Deposit, \$30.00. First semester (2). Associate Professor Ewing.

CIVIL ENGINEERING

PROFESSORS SUTHERLAND, FOGG, WILSON, AND SLATER,

ASSOCIATE PROFESSORS S. A. BECKER AND FULLER,

ASSISTANT PROFESSORS PAYROW, UHLER, AND JENSEN,

MESSRS. NETTLES, HOLME, AND KEYSER

C.E. 1. ENGINEERING DRAWING. The use of drawing instruments; lettering and tracing; mechanical drawing of objects; simple projections; isometric drawing. First semester (2).

C.E. 2. ENGINEERING DRAWING. The descriptive geometry of projections, intersections, and developments; plans, elevations, and sections of simple structural details. Prerequisite: C.E. 1. Second semester (2).

C.E. 6. LAND AND TOPOGRAPHIC SURVEYING. The theory and practice of land surveying, including computation of areas, dividing land, determining heights and distances; map drawing and topographic signs; field work with level and transit; map drawing from students' field notes; theory and use of stadia;

detailed field work in rough country; pen topography and contour maps. Prerequisites: plane trigonometry and engineering drawing. Summer camp: a recitation and seven hours of field work each week-day for four weeks, beginning June 1, 1931. Tuition fee, \$40.00 (4).

C.E. 7. RAILROAD SURVEYING. Reconnaissance, preliminary and location methods, with the theory of curves. Prerequisite: C.E. 6. Summer camp: a recitation and seven hours of field work each week-day for two weeks, immediately following C.E. 6. Tuition fee, \$20.00 (2).

C.E. 8. MECHANICS OF MATERIALS. The elasticity and strength of timber, brick, stone, and metals; theory of beams, columns, and shafts, with the solution of many practical problems. Prerequisites: Phys. 1 and 4, Math. 5. First semester (4).

C.E. 9. MECHANICS OF MATERIALS. An abridgment of C.E. 8. Prerequisites: Phys. 1 and 6, Math. 5. First semester (3).

C.E. 10. MATERIALS TESTING LABORATORY. Fourteen experiments made by each student on wood, iron, and steel to determine the action of materials under stress and to study the physical properties of materials of construction. The Fritz Engineering Laboratory, where this work is done, is equipped with 20,000, 50,000, 300,000, and 800,000-pound machines for tension, compression, and flexure, a 50,000-inch-pound machine for torsion, and other apparatus for special work. Concurrent with C.E. 8 or 9. Fee, \$5.00. First semester (1).

C.E. 11. RAILROADS. Theory of curves and turnouts; preparation of profiles and maps; the computation of earth work and estimates of cost; the construction of road-bed, including ballast, cross ties, rails, switches, culverts, and other details. Prerequisite: C.E. 7. First semester (3).

C.E. 12. HYDRAULICS. Hydrostatics and theoretical hydraulics; the flow of water through orifices, weirs, tubes, pipes, and channels; naval hydromechanics; hydraulic motors; the solution of many practical problems. Prerequisites: Phys. 1 and 4, Math. 5. Second semester (3).

C.E. 13. HYDRAULICS. An abridgment of C.E. 12. Prerequisites: Phys. 1 and 4, Math. 5. First or second semester (2).

C.E. 14. HYDRAULICS LABORATORY. Fourteen experiments made by each student in the hydraulic section of the Fritz Engineering Laboratory, which is equipped with pumps, weirs, turbines, water-wheels, meters, and other apparatus for special work. Concurrent with C.E. 12 or 13. Fee, \$5.00. First or second semester (1).

C.E. 15. STRESSES IN FRAMED STRUCTURES. Analytical and graphical determination of stresses in roof and bridge trusses under dead, live, and wind loads; locomotive wheel loads on plate girders and bridge trusses. Prerequisite: C.E. 8 or 9. Second semester (4).

C.E. 16. HIGHWAY ENGINEERING. The location, construction, and maintenance of roads and pavements; highway design. Prerequisite: C.E. 6; highly desirable, C.E. 7. Second semester (3).

C.E. 20. GRAPHIC STATICS. Analysis of the stresses in roof trusses and miscellaneous structures by the force polygon; applications of the equilibrium polygon to the discussion of beams and girders. Prerequisites: Phys. 1 and 4, Math. 20. First semester (2).

C.E. 25. FOUNDATIONS. Construction and design. Second semester (2).

C.E. 27. CONTRACTS AND SPECIFICATIONS. Lectures on the essentials of contracts and specifications for engineering structures. Prerequisite: junior standing. First semester (3).

C.E. 29. SUMMER WORK IN CIVIL ENGINEERING. During the summer following the junior year, students are required to spend at least eight weeks in shop work or on engineering construction, and are required to submit a written report on same.

C.E. 30. STRUCTURAL STEEL DESIGN. A special course for seniors in Mining Engineering, with special attention given to the design of mine structures. Prerequisites: C.E. 9 and 20. Second semester (3).

C.E. 50. THESIS. Thesis may be taken only by students of outstanding ability. In the majority of cases it can be carried as an extra subject in one or both semesters. First or second semester.

For Advanced Undergraduates and Graduates

C.E. 118. STRUCTURAL STEEL DESIGN. Lectures and recitations. Theory of structural steel design and complete calculations for a through plate girder railroad bridge and for a highway truss bridge; design of mill buildings and miscellaneous structures. Concurrent with C.E. 119. Prerequisite: C.E. 15. First semester (4).

C.E. 119. BRIDGE AND BUILDING CONSTRUCTION. Design and working drawings for structures, including a plate girder railway bridge, a highway truss bridge, and a mill building. Concurrent with C.E. 118. First semester (2).

C.E. 121. HYDRAULIC AND WATER POWER ENGINEERING. Three recitations and one drawing-room exercise a week devoted to systems of water supply, including purification of systems, reservoirs, pipe lines, pumping plants; the design of a water supply distribution system; the measurement of flow in open channels by means of tubes and meters; water power; irrigation. Prerequisite: C.E. 12 or 13. Second semester (4).

C.E. 122. GEODESY. Recitations, calculations, field work. Precise leveling; adjustment of instruments and investigation of their systematic errors; elements of least squares and their application to the adjustment of triangulations; field work in triangulation, in determination of azimuth, and with the plane table. Prerequisite: C.E. 6. Second semester (3).

C.E. 123. RAILROADS AND TERMINALS. Maintenance of way and the elements of railroad operation. Lectures on the economics of railroad location; the arrangement of yards, stations, and terminals; train resistance; the application of electricity to the operation of railroads. Prerequisite: C.E. 11. Second semester (3).

C.E. 124. HIGHER STRUCTURES. An introduction to the theory of statically indeterminate structures. Prerequisite: C.E. 15. Second semester (3).

C.E. 125. REINFORCED CONCRETE DESIGN. Theory of reinforced concrete; design of reinforced concrete buildings, bridges, and retaining walls. Prerequisite: C.E. 8 or 9; highly desirable: C.E. 15. First semester (3).

C.E. 126. CEMENT AND CONCRETE LABORATORY. The manufacture, properties, and testing of cement, mortar, and concrete. All the standard tests made by each student on cement and on reinforced concrete beams and columns in the Fritz Engineering Laboratory. Concurrent with C.E. 125. Fee, \$5.00. First semester (1).

C.E. 128. SANITARY ENGINEERING. Systems of sewerage and methods of sewage treatment and disposal; the design of a sewerage system; house drainage. Prerequisite: C.E. 12 or 13. First semester (3).

C.E. 131. ADVANCED SANITARY ENGINEERING. Continuation of C.E. 128. Second semester (3).

C.E. 132. ADVANCED HIGHWAY ENGINEERING. Continuation of C.E. 16. Second semester (3).

For Graduates

The following courses are open to engineering graduates only. The prerequisite for any course listed is the undergraduate course of similar title. Math. 217 and 218, Theory of Elasticity, may be included in a graduate major in Civil Engineering.

C.E. 201. STRUCTURES. The design and investigation of statically indeterminate structures of steel and reinforced concrete, including arches. First semester (4). Professor Sutherland.

C.E. 202. STRUCTURES. Continuation of C.E. 201. Second semester (4). Professor Sutherland.

C.E. 203. MATERIALS. The properties of materials of construction, with special reference to research, specification, and testing. Original researches by the student in the laboratory. First semester (3). Professor Slater, Associate Professor Fuller.

C.E. 204. MATERIALS. Continuation of C.E. 203. Second semester (3). Professor Slater, Associate Professor Fuller.

C.E. 205. RAILROAD ENGINEERING. The economic location of railroads, as influenced by probable volume of traffic and cost of construction and operation; a study of the virtual profile in

reducing gradients. with discussion of special cases. First semester (2). Professor Wilson.

C.E. 206. RAILROAD ENGINEERING. Continuation of C.E. 205. Second semester (2). Professor Wilson.

C.E. 207. SANITARY AND HYDRAULIC ENGINEERING. The designing of reservoirs, tanks, and pipe lines for water supply systems, and of sewers and other appurtenances for sewerage systems. Inspection of existing plants, with reports thereon. First semester (4). Assistant Professor Payrow.

C.E. 208. SANITARY AND HYDRAULIC ENGINEERING. Continuation of C.E. 207. Second semester (4). Assistant Professor Payrow.

ECONOMICS

See Business Administration

EDUCATION

See Philosophy, Psychology, and Education

ELECTRICAL ENGINEERING

PROFESSOR SEYFERT. ASSOCIATE PROFESSORS BEAVER AND CREEDY.
ASSISTANT PROFESSORS GRUBER, A. R. MILLER, AND HIBSHMAN,
MESSRS. ANDRESS, FORMHALS, KNUTSON, AND WILLS

E.E. 1. PRINCIPLES OF ELECTRICAL ENGINEERING. Electric units and electric circuits; electric power and energy; resistance computations; electrolytic conduction; the magnetic circuit; the magnetic field. Prerequisites: Phys. 1, Math. 2, 3, and 20. (Phys. 6, 7 and Math. 4 simultaneously.) First semester (1).

E.E. 2. DIRECT-CURRENT MACHINERY. Study of induced and generated potentials; magnetic properties of iron and steel; force on a conductor; the construction, operation, and control of direct-current machinery, armature windings; characteristic curves. Illustrative problems. Prerequisites: Phys. 6, 7, Math. 4, and E.E. 1. Second semester (3).

E.E. 3. DYNAMO LABORATORY. ELEMENTARY. Introductory course supplementing the class work of E.E. 2. Experimental

studies and tests of direct-current generators, motors, and appliances, for characteristics, regulation, efficiency, insulation, etc. Prerequisites: E.E. 1, Phys. 6 and 7. (E.E. 2 simultaneously.) Fee, \$6.00. Second semester (1).

E.E. 4. ALTERNATING CURRENTS, ELEMENTARY. Alternating-current conceptions; study of circuit laws for series and parallel circuits containing R, L and C; vector methods; complex quantities; single- and poly-phase circuits and measurement of power; alternating-current instruments. Lectures, recitations, and problem work. Prerequisites: Math. 5, Phys. 6 and 7, and E.E. 2. First semester (3).

E.E. 5. DYNAMO LABORATORY, INTERMEDIATE, DIRECT CURRENT. Continuation of E.E. 3. Advanced testing of direct-current machines. Alternating-current circuit experiments. Prerequisites: E.E. 2 and 3. Fee, \$6.00. First semester (1).

E.E. 6. ALTERNATING CURRENTS, ADVANCED. Continuation of E.E. 4. Non-sinusoidal waves (Fourier analysis); mutual inductance; transformer; the induction motor; introduction to synchronous machines. Lectures, recitations, and problem work. Prerequisites: Math. 6, E.E. 4. Second semester (3).

E.E. 8. DYNAMO LABORATORY, INTERMEDIATE, ALTERNATING CURRENT. Continuation of E.E. 5. Advanced testing of direct-current machines; alternating-current machinery testing begun. Lectures on methods of testing d.c. machinery and transformers. Prerequisites: E.E. 4 and 5. Fee, \$6.00. Second semester (2).

E.E. 11. DYNAMO LABORATORY, ADVANCED. Advanced experimental studies and tests of direct- and alternating-current generators and motors, synchronous converters, transformers, and auxiliary apparatus. Lectures on methods of testing a.c. machinery. Prerequisites: E.E. 6 and 8. Fee, \$12.00. First semester (3).

E.E. 15. ELECTRICAL ENGINEERING SEMINAR. A weekly meeting held in the department lecture room for discussion of topics from the current journals of theoretical and applied electricity. Presentation of papers on assigned topics. Prerequisite: E.E. 6. First semester (1).

E.E. 16. ELECTRICAL ENGINEERING SEMINAR. Continuation of E.E. 15. Prerequisite: E.E. 15. Second semester (2).

E.E. 19. DYNAMO LABORATORY, ADVANCED. Continuation of E.E. 11. Advanced alternating-current machinery testing. Prerequisites: E.E. 10, 11, and 112. Fee, \$12.00. Second semester (2).

E.E. 20. ELECTRIC TRACTION. The construction, equipment, and operation of different types of electric railways. The application of electric traction under steam railroad conditions; the dynamics of electric train movements; predeterminations of speed-time curves and the power required for different types of runs; choice of car equipment; cost of construction and of operation; testing of railway systems. Prerequisites: E.E. 112 and 114. Second semester (3).

E.E. 21. ELECTRICAL COMMUNICATION, I. The principles of telephone and telegraph communication. Class work includes a physical and mathematical analysis of the fundamental telephone and telegraph circuits and constants, the propagation of electric waves along wires and cables, transmission problems and practice, and carrier current communication. Laboratory work consists of experimental checks upon the theory developed in the class room. Prerequisite: E.E. 4 or 52. Fee, \$6.00. First semester (3).

E.E. 23. THESIS FOR DEGREE OF B.S. IN ELECTRICAL ENGINEERING. Each candidate for this degree may elect to present a thesis upon a subject chosen by the candidate during the first semester of the senior year. The work upon which the thesis is based may be done during either the first or second semester of the senior year and consists in part of reading from references furnished by the professor in charge, and in part of independent work in theory, experimental research, or designing. Reports of progress on thesis work required from time to time during the semester. Much importance is attached to the thesis as evidence of the candidate's ability to carry out an independent investigation. First or second semester (3).

E.E. 24. SUMMER WORK. During the vacation following the junior year each student in Electrical Engineering is required to spend at least eight weeks in getting practical experience in

some approved shop or plant. A written report on the shop or plant, and the experience gained therein, is due December 3. These reports should contain such calculations, photographs, drawings, and plots as each individual case may require.

E.E. 26. ELECTRICAL COMMUNICATION, II. A survey of the methods of electrical communication, principles of various systems of wire telegraphy, wire telephone, radio telegraphy and telephony, and laboratory measurements on radio and other communication circuits. Prerequisite: E.E. 4 or 52. Fee, \$6.00. Second semester (3).

E.E. 50. DYNAMOS AND MOTORS, GENERAL. An abbreviated course adapted to those students who do not continue this subject in the following year; the principles and practice of direct-current engineering, including: the elementary theory, construction, operation, and control of direct-current generators and motors, electromagnets, solenoids; illustrative problems. Prerequisite: Phys. 5. First or second semester (2).

E.E. 51. DYNAMO LABORATORY, BEGINNING. Introductory course supplementing the class work of E.E. 50. Experimental studies and tests of direct-current generators and motors for characteristics, regulation, efficiency, etc. Requisite: E.E. 50 simultaneously. Fee, \$6.00. First or second semester (1).

E.E. 52. ALTERNATING CURRENTS, GENERAL. A course following E.E. 50; the principles and practice of alternating-current engineering; the theory of alternating currents with applications to alternating-current generators, motors, transformers, and other apparatus; systems of transmission and distribution. Prerequisite: E.E. 50. First or second semester (2).

E.E. 53. DYNAMO LABORATORY, INTERMEDIATE. Continuation of E.E. 51, supplementing the class work of E.E. 52 and 54. Advanced testing of direct-current machines; practice in operating and testing alternating-current apparatus. Prerequisites: E.E. 50 and 51 (E.E. 52 or 54 simultaneously). Fee, \$6.00. First or second semester (1).

E.E. 54. ELECTRICAL ENGINEERING, APPLICATIONS. A course particularly adapted to students who do not specialize further along electrical lines; systems of generation, transmission, distribution, and utilization taken up in order; under utiliza-

tion special attention given to the application of electric motors to various industries; estimates and costs; problems. Prerequisites: E.E. 50, 51, and 52. Second semester (2).

E.E. 55. DYNAMO LABORATORY, ADVANCED. Continuation of E.E. 53, consisting of advanced direct- and alternating-current studies and tests. Primarily for non-electrical students taking more than the usual two semesters of dynamo laboratory. Prerequisites: E.E. 52 and 53. Fee, \$6.00. Second semester (1).

E.E. 56. ELECTRICAL MACHINERY. An abbreviated course covering the elementary principles of direct- and alternating-current machinery adapted to students requiring a minimum of electrical engineering, including: construction and operation of direct- and alternating-current generators and motors, transformers, converters, and related equipment. Prerequisite: Phys. 5. Second semester (2).

E.E. 57. DYNAMO LABORATORY, COMBINED. A brief course covering the simpler tests on direct- and alternating-current circuits and apparatus accompanying the class work of E.E. 56. Requisite: E.E. 56 simultaneously. Fee, \$6.00. Second semester (1).

For Advanced Undergraduates and Graduates

E.E. 112. ALTERNATING-CURRENT MACHINERY. Study of the structural details, characteristics, and operation of alternators, alternating-current motors, synchronous converters, and transformers. Prerequisite: E.E. 6. First semester (3).

E.E. 113. ELECTRICAL DESIGN. Application of electric, magnetic, and mechanical principles to the design of direct-current generators and transformers; predetermination of characteristics and performance; armature winding. Lectures, recitations, problems, drafting. Prerequisites: E.E. 6 and 8. First semester (3).

E.E. 114. ELECTRIC STATIONS. Consideration of prime movers; generating machinery, discussion of types and operation; auxiliary machinery and transformers; storage batteries and their application; switch-boards, measuring and protective devices; design and arrangement; station characteristics; substations; operation and management; methods and principles of rate making; visits to neighboring plants. Prerequisites: C.E. 13, M.E. 23, and E.E. 6 or 52. First semester (3).

E.E. 117. ELECTRICAL DESIGN. Continuation of E.E. 113. Application of electric, magnetic, and mechanical principles to the design of alternators and induction motors; predetermination of characteristics and performance; rotor and stator windings. Lectures, recitations, problems, and drafting. Prerequisites: E.E. 11 and 112. Second semester (3).

E.E. 118. ELECTRIC POWER TRANSMISSION. The long distance transmission of power by electricity; mathematical determination of line constants, regulation, interference, transients, etc.; switching and protection of circuits. Prerequisites: E.E. 112 and 114. Second semester (3).

E.E. 122. ELECTRIC TRANSIENTS. A recitation, lecture, and laboratory course in elementary electric transients, designed to give a physical and quantitative idea of the more common transients occurring in electrical circuits, apparatus, and transmission lines; oscillograms of transients obtained in the laboratory to substantiate the theory of the classroom. Prerequisites: Math. 6, E.E. 10, 11, and 112. Fee, \$6.00. Second semester (3).

E.E. 127. DIELECTRIC PHENOMENA. A study of the fundamental principles of electrostatic and magnetic fields, laws of corona, etc., and their applications in the field of electrical engineering. Prerequisites: E.E. 112, Math. 21. Second semester (3).

For Graduates

For graduate students intending to take their major subjects in Electrical Engineering a preparation equivalent to the work required for the B.S. in E.E. degree is necessary. Math. 125, Operational Calculus, may be included as a graduate major in Electrical Engineering.

Graduate courses are given to qualified men from the industries of the surrounding district. To suit the convenience of these men the work is carried on in evening sessions.

E.E. 203. ELECTRICAL DESIGN. A course consisting of predeterminations by calculation of the characteristics, regulation, and performance of electrical machinery. Analysis and use of designing constants. Design of special machines. First semester (3). Associate Professor Beaver.

E.E. 204. ELECTRICAL DESIGN. Continuation of E.E. 203. Second semester (3). Associate Professor Beaver.

E.E. 207. ELECTRICAL TESTING. Special experimental research in electrical engineering; tests of magnetic properties of iron and steel; investigation of the series single-phase alternating-current motor; leakage reactance of induction motors; regulation of alternators; machine transients; polyphase testing. Fee, \$12.00. First semester (3). Professor Seyfert and Assistant Professor Hibshman.

E.E. 208. ELECTRICAL TESTING. Continuation of E.E. 207. Fee, \$12.00. Second semester (3). Professor Seyfert and Assistant Professor Hibshman.

E.E. 209. RADIO COMMUNICATION. The theory underlying the various sending and receiving systems, and the propagation of electromagnetic waves, combined with experimental work in connection with the department's wireless equipment. First semester (2). Professor Seyfert.

E.E. 210. RADIO COMMUNICATION. Continuation of E.E. 209. Second semester (2). Professor Seyfert.

E.E. 211. ELECTRIC TRANSIENTS. The theory of transients in the more complicated types of electrical circuits, electrical apparatus, and transmission lines, as applied in electrical engineering; oscillograms of all transient phenomena discussed taken in the laboratory. Two lectures and one laboratory period per week. Fee, \$6.00. First semester (3). Assistant Professor Miller.

E.E. 212. ELECTRICAL TRANSIENTS. Continuation of E.E. 211. Treatment of circuits and transients by operational calculus methods. Second semester (3). Assistant Professor Miller.

E.E. 213. ADVANCED THEORY OF POWER TRANSMISSION. A course covering methods of determining the exact solution of transmission line problems; study of line transients and short circuits; problems on power limits and stability of systems. First semester (3). Professor Seyfert and Assistant Professor Miller.

E.E. 214. ADVANCED THEORY OF POWER TRANSMISSION. Continuation of E.E. 213. Second semester (3). Professor Seyfert and Assistant Professor Miller.

ENGLISH

PROFESSORS SMITH AND LUCH, ASSISTANT PROFESSORS RILEY,
MAC DOUGALL, AND RHOADS, MESSRS. BRAUNLICH, FINCH,
PARKS, SLOANE, GRAMLEY, DEPTULA, AND FLETCHER

Engl. 0-1-2-3a-3b. FRESHMAN COMPOSITION AND LITERATURE. The freshmen are distributed, upon the basis of preliminary tests given during Freshman Week, into three groups: low, English 0; middle, English 1; high, English 3a. The low group receives drill in grammar and in the mechanics of composition; the middle group studies exposition; the high group reads widely in literature as a basis for critical writing.

Engl. 1 and 2 constitute the minimum freshman requirement. Since no college credit is given for Engl. 0, the students in the low group are required to take Engl. 2 either in summer session or during the second year, in order to complete the six required hours. A student whose work shows that he has been placed in the wrong group may be transferred to the higher or to the lower group at any time during the year, if his instructor recommends and the head of the department approves the transfer. First and second semesters (3).

Engl. 3a. TYPES OF WORLD LITERATURE. A study of the masterpieces of world literature. Required of freshmen in the high group, and recommended for students, especially sophomores, who are taking a major in literature. First semester (3).

Engl. 3b. Continuation of Engl. 3a. Second semester (3).

ENGLISH LITERATURE AND COMPOSITION

Students who major in English literature are required to take Engl. 4, 5; 123 and 124, or equivalent courses on the recommendation of the advisor in charge of the major work.

Normally a major in English should elect two English courses in the junior year, and at least two in the senior year. Students working for honors take a seminar course in which they prepare a thesis as part of the honors requirement. Latin, French, and German are languages essential to scholarly work in English seminars; and courses in English History and Fine Arts are also recommended. A student choosing English as

his major should secure at once the list of readings to be covered in preparation for the comprehensive examination in the senior year.

Engl. 4. A STUDY OF THE DRAMA. Reading and critical study of types of the drama; theories of the drama; the drama and the stage; the drama as a criticism of life. Required of English majors. Prerequisites: Engl. 1 and 2, or 3a and 3b. First semester (3).

Engl. 5. A STUDY OF THE DRAMA. Continuation of Engl. 4. Second semester (3).

Engl. 6. THE MODERN ESSAY. An advanced composition course in writing essays and narrative types with a study of leading modern essayists. Prerequisites: Engl. 1 and 2. First semester (3).

Engl. 7. THE SHORT STORY. A critical study of the short story, English, American, and continental. Class discussions, extensive collateral reading, and reports. Prerequisites: Engl. 1 and 2. Second semester (3).

Engl. 18. THE NOVEL. A study of types of the novel. Reading and reports. Lectures on the history of the novel in England and America. Prerequisites: six hours of English. First semester (3).

Engl. 19. THE NOVEL. Continuation of Engl. 18. Second semester (3).

Engl. 20. AMERICAN LITERATURE, 1607-1855. Lectures, textbook, and supplementary reading. Prerequisites: six hours of English. Not given in 1931-1932. First semester (3).

Engl. 21. AMERICAN LITERATURE, 1855 TO THE PRESENT. Continuation of Engl. 20. Not given in 1931-1932. Second semester (3).

Engl. 33. THE BIBLE AS LITERATURE. First semester (1).

Engl. 34. THE BIBLE AS LITERATURE. Second semester (1).

Engl. 41. BUSINESS CORRESPONDENCE. The basic principles of letter writing for the business man and engineer. Practice in writing letters of inquiry, application letters, sales letters, adjustment letters, credit letters, letters of reply, and collection letters. Prerequisite: Engl. 1 and 2. Each semester (3).

Engl. 42. **WRITING FOR BUSINESS.** Study and practice of all types of reports which the engineer or business man must write, from the short letter report to the long technical report. Writing for house organs, employees' magazines, trade and technical journals. Prerequisites: Engl. 1 and 2. Each semester (3).

For Advanced Undergraduates and Graduates

Engl. 115. **THE BIBLE AS LITERATURE.** An outline study of the history of the origin and of the transmission of the books and collections of books that make up the Bible; a survey of the chief translations, especially in as far as they are of literary importance; a more detailed study of the types of literature found in the Bible; and an estimate of the influence of the Bible upon world literature, with special reference to English literature. First semester (3).

Engl. 116. **THE BIBLE AS LITERATURE.** Continuation of Engl. 115. Second semester (3).

Engl. 117. **CONTEMPORARY DRAMA.** A study of types of the drama. Summer session (3).

Engl. 120. **THE NINETEENTH CENTURY NOVEL.** A critical study of the masterpieces of the English, the American, and the European novel in the nineteenth century. Prerequisites: junior standing or the consent of the head of the department. Summer session (3).

Engl. 121. **CONTEMPORARY LITERATURE.** A study of present-day American writers exclusive of the drama. Collateral readings and reports. Prerequisite: junior standing or the consent of the head of the department. First semester (3).

Engl. 122. **CONTEMPORARY LITERATURE.** A study of present-day English and European writers exclusive of the drama. Collateral reading and reports. Prerequisite: junior standing or the consent of the head of the department. Second semester (3).

Engl. 123. **SHAKESPEARE AND THE ELIZABETHAN DRAMA.** A study of the development of the English drama to 1642, including the important plays of Shakespeare. Prerequisite: twelve hours of English. First semester (3).

Engl. 124. SHAKESPEARE AND THE ELIZABETHAN DRAMA. Continuation of Engl. 123. Second semester (3).

Engl. 125. ENGLISH LITERATURE OF THE ROMANTIC ERA. Prerequisite: twelve hours of English. First semester (3).

Engl. 126. ENGLISH LITERATURE OF THE VICTORIAN AGE. Prerequisite: twelve hours of English. Second semester (3).

Engl. 131. MILTON AND THE SEVENTEENTH CENTURY. A survey of the life and literature of the seventeenth century with special study of Milton. Prerequisite: junior standing or the consent of the head of the department. Not given in 1931-1932. First semester (3).

Engl. 132. EIGHTEENTH CENTURY LITERATURE. A study of the writings of Pope, Swift, and other Augustans, followed by a study of Dr. Johnson and his circle. Prerequisite: junior standing or the consent of the head of the department. Not given in 1931-1932. Second semester (3).

For Graduates

Students expecting to secure a Master's degree in English should have pursued major work in English during their college years, or have taken a sufficient number of advanced English courses to satisfy the department that they have a foundation for the graduate courses. Students must elect courses in the 100 group to make up any deficiency in this respect before receiving full graduate standing. As a part of the regular requirements for the Master of Arts degree a satisfactory thesis or its equivalent in research must be submitted.

Engl. 220. GRADUATE SEMINAR. An intensive study of the works of an English author. Summer session (3). Assistant Professor Riley.

Engl. 227. ANGLO-SAXON. A study of the Anglo-Saxon language and literature. Lectures and supplementary reading in the history of the English language and its relation to other Indo-European languages. First semester (3). Assistant Professor Riley.

Engl. 228. CHAUCER. A study of the life and principal works of Chaucer, with some attention to his chief con-

temporaries. Lectures, readings, class discussions, and reports. Second semester (3). Assistant Professor Riley.

Engl. 229. LITERARY CRITICISM. A course aimed to correlate and unify the student's previous work in literature by means of wide reading in critical literature and discussions of theories and schools of criticism. First semester (3). Professor Smith.

Engl. 230. LITERARY CRITICISM. Continuation of Engl. 229. Second semester (3). Professor Smith.

PUBLIC SPEAKING

Engl. 10. PUBLIC SPEAKING. A foundation course in the various types of public address. Particular stress is laid in this course upon ability to think in spoken discourse and to attain ease and proficiency in the use of body and voice. First semester (3).

Engl. 11. PUBLIC SPEAKING. A course giving training beyond that of Engl. 10. Analysis of the psychological aspects of the speech situation; study of models; delivery of speeches prepared for audiences of various kinds. Second semester (3).

JOURNALISM

Students majoring in journalism take Engl. 43, 44, 46, 47, 50, and 51. They must also complete four semesters of Engl. 48. Other requirements include twelve hours to be chosen from the following courses: Engl. 4, 5, 6, 7, 123, and 124 or such equivalents as may be allowed; and also Hist. 25 and 26, Govt. 51 and 52, Psych. 1 and 4, Bus. 3, 4, 161, and 162. During the junior or senior year a field trip to New York is taken to visit several plants connected with metropolitan journalism. The comprehensive examination in journalism will include the content of the courses studied in the sophomore, junior, and senior years.

Engl. 43. NEWSPAPER REPORTING AND WRITING. A beginning course in newspaper journalism. Definition of news; news values and reader interest; structure of the news story; newspaper English; how to report and write simple news stories. During the three-hour laboratory period the class organizes as a newspaper staff and "covers" the city of Bethlehem. Copy

written in the laboratory is read immediately and handled as it would be in a newspaper editorial room. Prerequisites: Engl. 1 and 2. Fee, \$2.00. First semester (3).

Engl. 44. ADVANCED NEWSPAPER REPORTING AND WRITING. Continuation of Engl. 43. A laboratory course in the reporting and writing of particular types of news. Fee, \$2.00. Second semester (3).

Engl. 46. NEWSPAPER EDITING AND COPY READING. A study of the problems and technique of the newspaper copy reader and news editor. During the laboratory period members of the class act as editors and copy readers with members of Engl. 43 as their staff. Prerequisites: Engl. 43 and 44. Fee, \$1.50. First semester (3).

Engl. 47. THE HEADLINE AND MAKEUP. A study of the problems and technique of the newspaper managing editor and makeup man. Prerequisite: Engl. 46. Fee, \$1.50. Second semester (3).

Engl. 50. EDITORIAL WRITING. The content and technique of the editorial. Considerable discussion of sociological problems as subjects of editorials. A study of the editorial pages and policies of leading American newspapers. Prerequisites: Engl. 43 and 44. First semester (3).

Engl. 51. NEWSPAPER PROBLEMS AND POLICIES. A study of the ethical principles of newspaper publishing: "To print or not to print." Sensational or "yellow" journalism. Evaluation of the policies of leading American newspapers. The organization of a newspaper editorial staff and the duties of the various officers. Prerequisites: Engl. 43 and 44. Second semester (3).

Engl. 48. BROWN AND WHITE. Enrollment in this class constitutes membership on the staff of the semi-weekly paper. All composition work is for publication. By faculty action this course may be elected each semester for credit in addition to other courses on a student's roster. No prerequisites. Fee, \$1.00. Both semesters (1).

FINE ARTS

ASSISTANT PROFESSOR HOWLAND

F.A. 1. HISTORY AND APPRECIATION OF THE FINE ARTS. Presentation of elementary principles that will enable the beginner to attain some knowledge and enjoyment of the fine arts; the historical development of art traced through the ancient and mediaeval periods. Lectures. First semester (3).

F.A. 2. HISTORY OF THE FINE ARTS. Continuation of F.A. 1. The art of the Renaissance and present day. Second semester (3).

F.A. 3. HISTORY OF ARCHITECTURE. Lectures covering the development of architecture from its beginnings in Egypt and Mesopotamia, through Greece and Rome to the Early Christian period, touching upon the building of the Orient. First semester (3).

F.A. 4. HISTORY OF ARCHITECTURE. Continuation of F.A. 3. Romanesque and Gothic architecture, the Renaissance, and developments down to present day building. Second semester (3).

F.A. 5. FREEHAND DRAWING. Elementary freehand perspective, followed by drawing from still life objects in pencil, charcoal, and in the various modes: delineation, form-drawing, color-value. First semester (3).

F.A. 6. FREEHAND DRAWING. Further practice in expression; color theory with simple exercises in water color. Second semester (3).

F.A. 17. CRITICISM AND ANALYSIS OF ART. An advanced course primarily for majors. Readings, investigations, reports, conferences in regard to the works of writers on art with special reference to painting, particularly from the following men: Aristotle, Leonardo da Vinci, Cennino Cennini, Joshua Reynolds, Tolstoi, Lessing, Taine, Goethe, Ruskin, Whistler, Cox, Baldwin Brown, Cortissoz, John LaFarge, Clive Bell, Berenson, Osvald Siren, Phillips, Nordau. The attempt will be made to formulate the theories of art upon which the criticisms are based as well as a study of the paintings themselves in the light of these comments. There will also be an effort to distinguish the differing aims of the chief schools of art, with a chronological study of the changes which have

taken place in the attitude both of artist and of the public. This will be followed as time and the aptitude of the students permit by an analytical study of paintings from the compositional and interpretive points of view. Prerequisite: F.A. 1 and 2 or the ability to satisfy the instructor of one's suitable preparation in the history of fine arts. Prospective students should consult the instructor before enrolling. First semester (3).

F.A. 18. CRITICISM AND ANALYSIS OF ART. Continuation of F.A. 17. Second semester (3).

GEOLOGY

PROFESSOR B. L. MILLER

ASSISTANT PROFESSORS TURNER AND FRETZ, MR. WHITCOMB

Geol. 1. MINERALOGY. The principles of crystallography with practice in determination of forms of models and crystals; the physical properties, origin, occurrence, association, and alteration of minerals; a study of about two hundred of the common mineral species and varieties, with practice in identification based on physical and chemical properties. Student should have had Chem. 1 and 11, or 3 and 13. Fee, \$5.00. First semester (4).

Geol. 1a. MINERALOGY. Similar to Geol. 1, except abbreviated. Fee, \$5.00. First semester (3).

Geol. 2. BLOWPIPE ANALYSIS. A course in qualitative blowpipe analysis in which the chemical and physical behavior of the common chemical elements and their compounds is noted; methods of rapid qualitative tests for the identification of minerals and chemical compounds with the aid of the blowpipe. Student should have had Chem. 1 and 11, or 3 and 13, and 20. Fee, \$2.00. First semester (1).

Geol. 3. INTRODUCTION TO GEOLOGY. A study of geologic processes designed to furnish an introductory survey of the subject of geology. Text-book and lectures. Concurrent with Geol. 6. First semester (2).

Geol. 4. GENERAL GEOLOGY. A course in dynamic, structural, and historical geology. Text-book, supplemented by illustrated

lectures in which the relation of geology to economic problems is discussed. Second semester (2).

Geol. 5. **PETROLOGY.** Macroscopic study of igneous, sedimentary, and metamorphic rocks; their origin, classification and identification. Concurrent with Geol. 4. Prerequisite: Geol. 1 or 1a. Second semester (1).

Geol. 6. **GEOLOGY FIELD TRIPS.** The region affords excellent examples of varied structures and contains numerous quarries and mines where slate, cement rock, limestone, sandstone, gneiss, serpentine, iron, and zinc are or have been obtained, and gravel, sand, and clay pits. When weather conditions prevent out-door work, in-door laboratory exercises are substituted. Concurrent with Geol. 3 and 4. Fee, \$1.00. First and second semesters (1).

Geol. 7. **NON-METALLIC ECONOMIC GEOLOGY.** A study of the origin, modes of occurrence, properties, sources, production, and uses of non-metallic mineral products. The major portion of the course is devoted to coal and petroleum. Prerequisites: Geol. 1, 3 or 4, 5, and 6. First semester (2).

Geol. 8. **HISTORICAL GEOLOGY.** A study of the development of the continents and life forms. A discussion of evolution based on the remains of animal and plant life preserved in the rocks. Text-book, lectures, and laboratory exercises. Prerequisite: Geol. 3 or 4. Second semester (3).

Geol. 16. **PHYSIOGRAPHY.** A study of the origin, history, and economic significance of topographic features, soils, and natural resources. When weather permits a field trip is taken each week; laboratory work devoted to instruction and practice in the interpretation and construction of topographic maps is substituted in inclement weather. First semester (3).

Geol. 17. **PHYSIOGRAPHY, CONTINUED.** Meteorology, climatology, oceanography, and geographical location are considered separately. This is followed by a consideration of these and other factors constituting the natural environment, in their effect upon man. Laboratory and field exercises. Prerequisite: Geol. 16, 3 or 4. Second semester (3).

Geol. 18. **METEOROLOGY AND CLIMATOLOGY.** A study of the atmosphere and its work followed by investigations of climate.

One laboratory period each week is devoted to meteorological instruments, preparation and interpretation of weather maps and other meteorological data, and making forecasts. Second semester (3).

For Advanced Undergraduates and Graduates

Geol. 108. **METALLIC ECONOMIC GEOLOGY.** A study of the geological occurrence, distribution, uses, and commercial production of the metalliferous minerals; consideration of the most important mining districts. Recitations, illustrated lectures, field trips, and laboratory examination of ore specimens from representative districts of North and South America; visits to the zinc mines of Franklin Furnace, N.J., and Friedensville, Pa., the magnetite mines of Dover, N.J., and Cornwall, Pa., and the anthracite coal regions. Prerequisites: Geol. 1, 3 or 4, and 5. Second semester (3).

Geol. 109. **PALEONTOLOGY.** The plant and animal fossils are studied mainly from the morphologic point of view; evolution of the faunas and floras. Lectures and laboratory work. Prerequisite: Geol. 3 or 4. First semester (3).

Geol. 110. **STRATIGRAPHY.** The principles of correlation of the sedimentary rocks based upon the conditions of sedimentation and the use of index fossils. Study in the laboratory of characteristic faunas, the geologic age, and geographic distribution and structural features of the rocks of North America. In the spring, field trips illustrating the use of sedimentary structures and faunas in the delimitation of periods and formations, and in the solution of other stratigraphic problems. For those who have not already had Geol. 8 or 109, a few weeks are devoted to a study of evolution and characteristic fossil forms. Prerequisite: Geol. 3 or 4. Second semester (2).

Geol. 111. **FIELD GEOLOGY.** Practice in the actual mapping of surface geology, each student being assigned a definite area and required to prepare a report on the assigned area accompanied by a geological map with structure sections; collection by each student of a full set of specimens to illustrate the geology. The first part of the course devoted exclusively to field work; the notes and specimens studied in the laboratory when the weather prevents further out-door work. Prerequisites: Geol. 3 or 4, 5, and 6. Fee, \$1.00. First semester (2).

Geol. 112. **PETROGRAPHY.** The optical properties of minerals and their study with the petrographic microscope; petrography of the most important igneous rocks. Lectures, recitations, and laboratory work. Prerequisites: Geol. 1 and 5. Fee, \$3.00. First semester (2).

Geol. 114. **STRUCTURAL GEOLOGY.** The study of special features of structural geology in the field and laboratory. Prerequisites: Geol. 3 or 4, and 6. First semester (1).

Geol. 115. **GEOLOGIC METHODS.** Methods used by the United States Geological Survey and by the mining companies that employ geologists; special attention to the problems that confront an economic geologist in the investigation of coal lands, oil properties, metal mines, etc. Prerequisite or concurrent: Geol. 111. First or second semester (1).

Geol. 116. **GEOLOGY SEMINAR.** Investigations of current and classic geological literature. Assigned readings and reports. Participated in by members of the teaching staff and advanced students. First and second semesters (1).

For Graduates

Geol. 220. **GEOLOGICAL INVESTIGATION.** The investigation and study of the literature of some special geological problem. Field and laboratory work on some district; map of a limited area; an investigation of the stratigraphic and structural features of the strata present; presentation of a thesis or dissertation embodying these results. Preparation required dependent upon the nature of the problems to be studied. Prospective students for this course should first consult the professor in charge. First semester (4). Professor Miller and Doctor Whitcomb.

Geol. 221. **GEOLOGICAL INVESTIGATION.** Continuation of Geol. 220. Second semester (4). Professor Miller and Doctor Whitcomb.

Geol. 222. **ADVANCED ECONOMIC GEOLOGY.** Advanced work in ore deposits. Study of the literature and of the theories of ore deposition, together with detailed work on the type occurrences of some of the metallic or non-metallic minerals; thorough investigation and report on some mining district

with special regard to the origin of the ores and such commercial aspects of the deposits as may depend chiefly on the geology: preparation and microscopic study of specimens of ores. Prerequisites: Geol. 7 and 108. First semester (3) to (6). Professor Miller.

Geol. 223. ADVANCED ECONOMIC GEOLOGY. Continuation of Geol. 222. Second semester (3) to (6). Professor Miller.

Geol. 224. ADVANCED PETROGRAPHY. A critical study of recent advances in petrographic methods and nomenclature; preparation of detailed report on a selected problem. Prerequisites: Geol. 1, 3 or 4, 5, and 112. Second semester (3). Assistant Professor Turner.

Geol. 225. ADVANCED PHYSIOGRAPHY. The detailed study of physiographic types and processes. Conferences, reports, and thesis, with work in the laboratory and field. Prerequisite: training in elementary physiography and general geology. First semester (4). Professor Miller.

Geol. 226. ADVANCED PHYSIOGRAPHY. Continuation of Geol. 225. Second semester (4). Professor Miller.

Geol. 227. PHYSICAL CRYSTALLOGRAPHY. An advanced course in the geometrical and physical properties of crystals with special reference to the Goldschmidt method of crystal measurement and projection. Prerequisites: Geol. 1, Phys. 6 and 7. First semester (2). Assistant Professor Fretz.

Geol. 228. CRYSTALLOGRAPHIC STRUCTURE. An advanced course in the molecular and atomic structure of metals and crystalline mineral salts and the point group system of space lattices. Assigned reading of the recent literature on the subject. Prerequisite: Geol. 1. First semester (1) or (2). Assistant Professor Fretz.

Geol. 229. COAL RESEARCH. A study of the constitution of coal, embracing a review of the literature and the preparation and microscopical examination of thin sections and polished surfaces. First or second semester (3). Assistant Professor Turner.

Geol. 230. COAL RESEARCH. Continuation of Geol. 229. First or second semester (3). Assistant Professor Turner.

GERMAN

PROFESSOR PALMER, ASSOCIATE PROFESSOR MORE,
ASSISTANT PROFESSOR KEGEL, MR. HARTZELL

Ger. 1. **ELEMENTARY GERMAN.** Each semester (3).

Ger. 2. **ELEMENTARY GERMAN.** Continuation of Ger. 1. Prerequisite: Ger. 1 or the equivalent. Second semester (3).

Ger. 3. **INTERMEDIATE GERMAN.** German prose and poetry. Outside reading. Composition. Prerequisite: Ger. 2 or the equivalent. First semester (3).

Ger. 4. **INTERMEDIATE GERMAN.** Continuation of Ger. 3. Prerequisite: Ger. 3 or the equivalent. Second semester (3).

Ger. 7. **GERMAN OF CHEMISTRY.** Rapid reading of selected texts on chemistry. Prerequisite: Ger. 2 or the equivalent. First semester (3).

Ger. 9. **ADVANCED GERMAN, PROSE AND POETRY.** Rapid reading of representative texts; collateral reading. Prerequisite: Ger. 4 or the equivalent. First semester (3).

Ger. 10. **GOETHE'S FAUST.** Study of Part 1. Lectures on the origin and development of the Faust story; collateral reading. Prerequisite: Ger. 3 or 4, or the equivalent. Second semester (3).

Ger. 21. **METHODS IN GERMAN.** A course for prospective teachers. Advanced German grammar, German composition, conversation, methods of teaching, and discussion of textbooks. Prerequisite: Ger. 10 or the equivalent. Second semester (3).

For Advanced Undergraduates and Graduates

Ger. 111. **NINETEENTH CENTURY GERMAN DRAMA.** Lectures, reading, reports on assigned work. Prerequisite: Ger. 10 or the equivalent. First semester (3).

Ger. 112. **NINETEENTH CENTURY GERMAN DRAMA.** Continuation of Ger. 111. Second semester (3).

Ger. 113. **LESSING, GOETHE, AND SCHILLER.** Prerequisite: Ger. 10 or the equivalent. First semester (3).

Ger. 114. LESSING, GOETHE, AND SCHILLER. Continuation of Ger. 113. Second semester (3).

Ger. 115. THE GERMAN SHORT STORY. Origin and development. Rapid reading of illustrative stories, with particular attention to Gottfried Keller, Theodor Storm, C. F. Meyer, and Paul Heyse; lectures and reports. Prerequisite: Ger. 10 or the equivalent. First semester (3).

Ger. 116. THE GERMAN SHORT STORY. Continuation of Ger. 115. Second semester (3).

GOVERNMENT

See History and Government

GREEK

PROFESSOR GOODWIN

Gk. 1. ELEMENTARY GREEK. For freshmen and sophomores who have entered without Greek, but who desire to take up the study in college. They perform in two years approximately the amount of work required for admission from those who present Greek, and are prepared to proceed in the third year with Gk. 5. The introductory book and a small portion of the *Anabasis* are studied in the first two semesters. This course will be given only in years when at least six applications are received. Prerequisite: None, but some knowledge of Latin is highly desirable. First semester (3).

Gk. 2. ELEMENTARY GREEK. Continuation of Gk. 1. Second semester (3).

Gk. 3. SECOND-YEAR GREEK. *Anabasis* continued; *Iliad* (if time permits); grammar and simple composition. Offered only when Gk. 1 and 2 have been given in the preceding year. Prerequisites: Gk. 1 and 2, or one year of entrance Greek. First semester (3).

Gk. 4. SECOND-YEAR GREEK. Continuation of Gk. 3. Second semester (3).

Gk. 5. ATTIC PROSE. Lysias, selected *Orations*, Xenophon, *Memorabilia*, or some other work. Review of the grammar; composition and other exercises; careful study of Attic prose

syntax; special attention given to the formation of correct methods of study and translation, to grammatical analysis, and to the reading aloud of Greek. Available time is employed in sight-reading. Herodotus. One book begun. Prerequisites: Gk. 1, 2, 3, and 4, or entrance Greek. First semester (3).

Gk. 6. HERODOTUS AND PLATO. Herodotus continued. Study of the forms and syntax of the Ionic dialect. Plato. *Euthyphro*, *Apology*, or other shorter dialogues. Grammar and composition as in the first semester. Prerequisite: Gk. 5. Second semester (3).

Gk. 7. THUCYDIDES. One or more books. Composition. Prerequisites: Gk. 5 and 6. First semester (3).

Gk. 8. TRAGEDY. Euripides. *Medea*, *Bacchae*, or another play. Sophocles. *Oedipus Tyrannus*, *Antigone*, or another. Literary study of the drama; poetical language, style, and conception; metrical reading; composition. Prerequisites: Gk. 5 and 6. Second semester (3).

Gk. 9. DRAMATIC POETRY (continued). Aeschylus, *Agamemnon* or *Prometheus Bound*. Aristophanes. *Clouds*, *Frogs*, or *Birds*. Aristophanes as humorist and as moralist, with consideration of the tendencies which he satirized. Metres. Elementary text-criticism. Prerequisites: Gk. 5, 6, and 8. First semester (3).

Gk. 10. GREEK ORATORY. Selections from the earlier Attic Orators and Demosthenes. Rapid reading, the student being supposed to have reasonable facility in understanding the Greek directly without rendering into English. Attention is directed largely to those points which illustrate the development of Greek prose style. Prerequisites: Gk. 5 and 6. Second semester (3).

Gk. 11. HOMER. Rapid reading of considerable portions of the *Iliad* or *Odyssey*. Homeric language, syntax, and metre reviewed, with some reference to the needs of intending teachers, but chiefly as a foundation for the study outlined in Gk. 12. Prerequisites: Gk. 5 and 6. First semester (3).

Gk. 12. LYRIC POETRY. Fragments of the Elegiac, Iambic, and Melic poets; selections from Pindar or Theocritus. Prerequisites: Gk. 5, 6, and 11. Second semester (3).

Gk. 13. HELLENISTIC GREEK. *New Testament*. Selections from Lucian. To be substituted on occasion for Gk. 12. Prerequisites: Gk. 5 and 6, and the approval of the professor. Second semester (3).

Courses Gk. 9 and 11, 10 and 12 (or 13) are offered in alternate years, and are open to both juniors and seniors.

Gk. 31. GREEK HISTORY. Lectures, text-book, and readings. For seniors and juniors. Not given in 1931-1932. Second semester (3).

Candidates for honors in Greek will be assigned special readings on request.

For Graduates

Candidates must satisfy the Professor of Greek as to their adequate preparation for the following courses. Ordinarily at least four years of Greek in college will be expected as a prerequisite.

Gk. 201. GREEK POETRY. The development of poetry in Greece from Homer to the Drama, with special study of the Lyric Poets, and collateral reading. First semester (3). Professor Goodwin.

Gk. 202. GREEK POETRY. Continuation of Gk. 201. Second semester (3). Professor Goodwin.

Gk. 203. GREEK PHILOSOPHY. The history of philosophic thought in Greece, particularly in the Pre-Socratic period. Ritter and Preller's *Historia Philosophiae Graecae*, and collateral reading. First semester (3). Professor Goodwin.

Gk. 204. GREEK PHILOSOPHY. Continuation of Gk. 203. Second semester (3). Professor Goodwin.

Gk. 205. HELLENISTIC GREEK. Portions of the *Gospels* in a comparative study, the *Acts*, and selected *Epistles*. Chapters from the *Septuagint*. Patristic literature. Collateral reading. Selections from Lucian. First semester (3). Professor Goodwin.

Gk. 206. HELLENISTIC GREEK. Continuation of Gk. 205. Second semester (3). Professor Goodwin.

HISTORY AND GOVERNMENT

PROFESSOR GIPSON, ASSOCIATE PROFESSOR S. M. BROWN,

ASSISTANT PROFESSORS HARMON AND SCHULZ

HISTORY

Hist. 7. HISTORY OF ENGLAND TO 1603. A study of Early Britain, the Anglo-Saxon Heptarchy and customs, the Norman Conquest, development of Parliament, continental wars, and the War of the Roses. First semester (3).

Hist. 8. HISTORY OF ENGLAND TO 1603, CONTINUED. The Tudor Dynasty; the breaking-up of the mediæval economy, the Reformation, rise of the middle class, mercantilism, and the era of exploration. Prerequisite: Hist. 7. Second semester (3).

Hist. 9. HISTORY OF ENGLAND, 1603 TO DATE. The Stuarts and the Protectorate; the new social conditions; conflict between king and Parliament; the Puritan Revolution; Cromwell and the Protectorate. To alternate with Hist. 7. Not given in 1931-1932. First semester (3).

Hist. 10. HISTORY OF ENGLAND, 1603 TO DATE, CONTINUED. Continental policy in the eighteenth century; the coming of Empire; the industrial revolution; political appearance of the cabinet; colonial expansion. Prerequisite: Hist. 9 or by permission. To alternate with Hist. 8. Not given in 1931-1932. Second semester (3).

Hist. 11. AMERICAN COLONIAL HISTORY. The period of discovery and exploration; rival settlements in North America by Spain, France, England, and Holland; the English colonial proprietors and the colonial charters; the growth of representative government; the beginnings of constitutional controversy. Not given in 1931-1932. First semester (3).

Hist. 12. AMERICAN COLONIAL HISTORY. The establishment of parliamentary trade restrictions; colonial immigration, trade, and finance; western expansion and the collapse of the French empire in America; the new colonial system and its breakdown; the war for Independence. Not given in 1931-1932. Second semester (3).

Hist. 13. UNITED STATES HISTORY. The era of constitution making; the evolution of political parties; foreign relations

during the wars of the French revolutionary period; the western movement and western state-building; the growth of sectionalism. First semester (3).

Hist. 14. UNITED STATES HISTORY. The war for the Union; the reconstruction of the South; the era of big industry and labor combinations; the United States as a world power; the new national paternalism. Second semester (3).

Hist. 22. QUEEN ELIZABETH AND HER CONTEMPORARIES. A study of the great personalities of this period. Not given in 1931-1932. Second semester (3).

Hist. 25. EUROPEAN HISTORY. A rapid survey of the major historic forces from the collapse of the Roman Empire to the sixteenth century. Emphasis placed upon the cultural aspects of mediæval society. First semester (3).

Hist. 26. EUROPEAN HISTORY. Continuation of Hist. 25. A more detailed account of historic developments in the eighteenth and nineteenth centuries with an attempt to set forth the more important political antecedents of the World War. Second semester (3).

Hist. 27. EUROPEAN EXPANSION AND EMPIRE BUILDING, 1492-1820. This course consists of a study of certain aspects of the phenomenon of the spread of European civilization and empire into the continents of America, Asia, and Africa. The following topics are emphasized: the progress of discovery, exploration, and settlement; European relations with the native peoples; the evolving of the imperial systems in the sixteenth and seventeenth centuries; imperial rivalries of the eighteenth century; the disintegration of the old empires of France, Spain, and England in the eighteenth and nineteenth centuries. First semester (3).

Hist. 28. EUROPEAN EXPANSION AND EMPIRE BUILDING, 1492-1820. Continuation of Hist. 27. Second semester (3).

Attention is called also to the following courses in History offered by other departments: ANCIENT HISTORY by the Department of Latin; ECONOMIC HISTORY by the Department of Economics and Business Administration; GREEK HISTORY by the Department of Greek.

For Advanced Undergraduates and Graduates

Hist. 103. ECCLESIASTICAL HISTORY. The Formative Period. Conditions in the Roman Empire; the Apostolic Age; the period of heresies; the Ante-Nicene Fathers: Arius, Athanasius, and the Sabellians. The Council of Nicæa. Prerequisites: Hist. 25 and 26, or by permission. Not given in 1931-1932. First semester (3).

Hist. 104. ECCLESIASTICAL HISTORY. The Period of Growth. The rise of the Papacy; monasticism; Imperium and Sacerdotium; growth of Canon Law; the twelfth century heresies; the Reformation; Council of Trent; subsequent changes. Prerequisite: Hist. 103 or by permission. Not given in 1931-1932. Second semester (3).

Hist. 115. THE RENAISSANCE. The decline of mediævalism; revived study of the humanities; influence on literature, art, religion, and society. A seminar course; admission by permission only. First semester (3).

Hist. 116. THE REFORMATION. Continuation of Hist. 115. The revolt within the church; its spread to Germany; Luther; Melancthon; Calvin; the sixteenth century commercial revolution; nationalist tendencies. Prerequisite: Hist. 115. Second semester (3).

Hist. 117. THE FRENCH REVOLUTION. The precursors of the Revolution: Quesnay and the Physiocrats, the "Intellectuals," Montesquieu, Voltaire, Rousseau; social and financial chaos. A seminar course. Admission by permission only. First semester (3).

Hist. 118. THE FRENCH REVOLUTION. Continuation of Hist. 117. The Revolution: political and constitutional changes; the spirit of the Jacobins; the Reign of Terror; reactions within France and beyond the Rhine; the submersion of the Republic in the Empire. Second semester (3).

Hist. 119. SEMINAR. Open to students of senior standing who desire to major in history or who have shown ability in the field of humanistic studies. A brief period of history is studied intensively. Subject for 1931-1932: "The British Empire in the Eighteenth Century." First semester (3).

Hist. 120. SEMINAR. Continuation of Hist. 119. Second semester (3).

Hist. 123. ENGLAND UNDER THE STUARTS. A course designed to give a general view of the constitutional and political development of the seventeenth century; a survey of social England. Summer session (3).

Hist. 129. AMERICAN FOREIGN POLICY. The French alliance; independence and boundaries; commercial restrictions; French Revolution and neutrality; purchase of Louisiana; War of 1812; acquisition of Florida; Monroe Doctrine; relations with France and Great Britain; Oregon and Texas; the Mexican War; manifest destiny; Isthmian diplomacy; China and Japan. First semester (3).

Hist. 130. AMERICAN FOREIGN POLICY. Civil War and possible European intervention; Alaska boundary; War with Spain; the new Caribbean policies; the World War; the League of Nations; Washington Conference; the aftermath of the Great War. Second semester (3).

Hist. 139. THE CIVIL WAR. Background of the Civil War; Buchanan's policy; Lincoln's attitude; views of Davis; Northern and Southern leaders contrasted. Not given in 1931-1932. First semester (3).

Hist. 140. RECONSTRUCTION OF THE UNION. Problems of a restored Union; the policy of Johnson; views of the North and South; radical reconstruction; the election of Grant; the Supreme Court and reconstruction; the restoration of white supremacy in the South. Not given in 1931-1932. Second semester (3).

Hist. 175. LEADING FIGURES IN EUROPEAN HISTORY. A series of biographical studies, treating of men and women in church and state from Charlemagne to Napoleon. Emphasis is cultural rather than purely historical. Summer session (3).

For Graduates

Students desiring to major in History and Government should have had at least twelve semester hours in connection with their undergraduate work that bear upon this field of study or in other ways should satisfy the Department

that they are in a position to undertake profitably the required program for the master's degree. Students should register for graduate work only after consultation with the head of the department.

Hist. 201. ENGLISH INSTITUTIONAL HISTORY. A study of political, social, economic, and religious institutions which have most profoundly influenced American civilization. Not given in 1931-1932. Second semester (3). Professor Gipson and Associate Professor Brown.

Hist. 202. ENGLISH INSTITUTIONAL HISTORY. Continuation of Hist. 201. Not given in 1931-1932. Second semester (3). Professor Gipson and Associate Professor Brown.

Hist. 211. ENGLISH COLONIZATION IN NORTH AMERICA IN THE SEVENTEENTH CENTURY. The activities of the great overseas trading companies; the problem of proprietorial control; the decline of the chartered colonies; conflicts between opposing political, economic, and religious ideals within the colonies. Not given in 1931-1932. First semester (3). Professor Gipson.

Hist. 212. ENGLISH COLONIZATION IN NORTH AMERICA IN THE SEVENTEENTH CENTURY. Continuation of Hist. 211. Not given in 1931-1932. Second semester (3). Professor Gipson.

Hist. 213. AMERICA IN THE EIGHTEENTH CENTURY. The workings of the English mercantile system; the evolution of colonial institutions; the international struggle for the fur trade in North America; George III and the new administrative system. Not given in 1931-1932. First semester (3). Professor Gipson.

Hist. 214. AMERICA IN THE EIGHTEENTH CENTURY. Continuation of Hist. 213. Not given in 1931-1932. Second semester (3). Professor Gipson.

Hist. 215. AMERICAN CONSTITUTIONAL HISTORY. The major problems involved in the growth of the powers of the national government. Not given in 1931-1932. First semester (3). Professor Gipson and Assistant Professor Harmon.

Hist. 216. AMERICAN CONSTITUTIONAL HISTORY. Continuation of Hist. 215. Not given in 1931-1932. Second semester (3). Professor Gipson and Assistant Professor Harmon.

Hist. 217. AMERICA AS A WORLD POWER. The relations of the United States with Latin America; the problem of the Pacific; the United States and Europe. Summer session (3). Professor Gipson and Assistant Professor Harmon.

Hist. 218. AMERICA AS A WORLD POWER. Continuation of Hist. 217. Not given in 1931-1932. Second semester (3). Professor Gipson and Assistant Professor Harmon.

Hist. 225. PENNSYLVANIA HISTORY. In this course various aspects of eighteenth century Pennsylvania history are studied such as the evolution of the institutions of government, the relations of the settlers to the proprietors, the land policy, the Indian policy, the relations of the various racial groups and religious groups toward one another and toward the provincial government, the relations of Pennsylvania and her colonial neighbors. Not given in 1931-1932. First semester (3). Professor Gipson.

Hist. 226. PENNSYLVANIA HISTORY. Continuation of Hist. 225. Not given in 1931-1932. Second semester (3). Professor Gipson.

Hist. 227. RESEARCH METHODS IN THE SOCIAL SCIENCES. This course is concerned primarily with the technique of research along the lines of historical method. It includes training in the critical handling of documentary materials and in measuring the value of evidence. Those processes involved in formal presentation of the results of research are stressed. Required of all graduate students in History and Government. Open to seniors by permission. First semester (3). Professor Gipson and Associate Professor Brown.

Hist. 228. RESEARCH METHODS IN THE SOCIAL SCIENCES. A continuation of Hist. 227. Second semester (3). Professor Gipson and Associate Professor Brown.

GOVERNMENT

Govt. 51. AMERICAN GOVERNMENT (NATIONAL). The evolution of the constitution; distribution of powers between the national government and the states; citizenship; nomination, election, and powers of the President; the machinery of legislation; the courts and the constitution. First semester (3).

Govt. 52. AMERICAN GOVERNMENT (STATE). The position of the states in the union; state constitutions; the executive, legislative, and judicial branches of state government; current criticisms and suggested reforms; instruments of popular control; the various forms of local government. Second semester (3).

Attention is also called to the courses in ROMAN LAW and ROMAN POLITICAL INSTITUTIONS offered by the Department of Latin.

For Advanced Undergraduates and Graduates

Govt. 156. INTERNATIONAL LAW. Consideration of the rules governing the conduct of States in their relations with one another in time of peace and during war. Not given in 1931-1932. Second semester (3).

Govt. 157. PROBLEMS OF MUNICIPAL MANAGEMENT. A study of the various factors involved in the efficient conduct of city government. Special emphasis given to the working of the city manager type of government. First semester (3).

Govt. 158. PROBLEMS OF MUNICIPAL MANAGEMENT. Examination of the fundamental principles of effective administration; a survey of such municipal problems as city planning, health control, urban transportation, police and fire protection, water supply, and waste collection and disposal. Second semester (3).

Govt. 159. POLITICAL CONCEPTS AND PRINCIPLES. Analysis of the basic concepts of political science: state, government, sovereignty, law, liberty, rights; consideration of the various types of governmental organization and the nature of the legislative, executive, and judicial functions. Not given in 1931-1932. First semester (3).

Govt. 171. THE FOUNDATION OF MEDIAEVAL THEORY. The Greek and Roman contribution; the political theory of the Old and New Testaments; the writings of the Church Fathers to and including Augustine. Not given in 1931-1932. First semester (3).

Govt. 172. THE POLITICAL THEORY OF THE MIDDLE AGES. The concordance of the Christian and Teutonic approaches to politics. A study of the leading theorists and political movements

from the fifth to the fifteenth centuries. Not given in 1931-1932. Second semester (3).

Govt. 173. POLITICAL THOUGHT IN MODERN TIMES. A survey of the political thought of Machiavelli, Luther, Calvin, Althusius, Bodin, Grotius, Hobbes, Locke, Montesquieu, Rousseau, and others down to the nineteenth century; consideration of the social contract, natural law, inalienable rights, and popular sovereignty theories. Open to juniors and seniors by permission. First semester (3).

Govt. 174. POLITICAL THOUGHT IN MODERN TIMES. A continuation of Govt. 173 bringing the history of political thought down to the present day. Examination of the political thought and ideas of groups such as the Socialists, Communists, Syndicalists, and Bolshevists. Second semester (3).

ITALIAN

See Romance Languages

INDUSTRIAL ENGINEERING

See Mechanical Engineering

JOURNALISM

See English

LATIN

PROFESSOR WRIGHT,

ASSOCIATE PROFESSOR E. L. CRUM, MR. R. H. CRUM

Lat. 1a. For freshmen who enter with four years of high-school Latin. PLINY. Selected letters. MARTIAL. Selected epigrams. VERGIL. *Bucolics*. Some study of Roman life under the Empire. The history and development of the epigram and of pastoral poetry; the influence of Latin poetry upon English literature emphasized. First semester (3).

Lat. 1b. For freshmen who elect the course after three years of high-school Latin. VERGIL. *Bucolics* and the *Aeneid* I-VI, or selections from OVID. Practice in reading aloud and scansion; training in sight translation; some study of the mythology

and religion of Greece and Rome; the influence of Latin poetry upon English literature emphasized. First semester (3).

Lat. 2. HORACE. Selected *Odes*. Lectures on the history and development of lyric poetry; constant practice in reading the more important lyric metres; memorizing of stanzas and passages from Horace. Second semester (3).

Lat. 4. LIVY. Selections from the earlier books. Some study of early Roman history and topography. CATALLUS. Selected poems. Prerequisites: Lat. 1 and 2. First or second semester (3).

Lat. 10. THE TEACHING OF HIGH SCHOOL LATIN. Discussion of aims, content, and methods, and of the standard texts used in preparatory school Latin, with a consideration of the report of The Classical Investigation, of Lodge's *Vocabulary of High School Latin*, and of Byrne's *Syntax of High School Latin*. Students preparing to teach Latin are expected to elect this course. Prerequisites: Lat. 3 and 4. First semester (3).

Lat. 11. ENGLISH WORDS DERIVED FROM THE LATIN. A course intended to give the student some familiarity with those Latin words that have contributed most largely in derivatives to the English language and to teach the intelligent use of the English dictionary. Elective for all students; no previous knowledge of Latin required. First semester (3).

Lat. 13. LATIN DRAMA. A study of drama among the Romans; native dramatic performances; indebtedness to Greek drama; the various dramatic forms and their vogue; chief writers; dramatic festivals; the Roman theatre; influences in later literature. Reading of selected plays of Plautus, Terence, and Seneca. Prerequisites: Lat. 1 and 2. First or second semester (3).

Lat. 21. ANCIENT HISTORY. A survey of the development of civilization from Paleolithic times to the world empire of Alexander the Great. The first six weeks are assigned to the Stone Ages, the Oriental nations, and the Minoan Civilization; the remainder of the semester to Hellenic Greece. In conjunction with an outline of political history, the social, economic, religious, philosophic, artistic, and literary development of the world is stressed, as well as the origin of political institutions. First semester (3).

Lat. 22. ANCIENT HISTORY. Continuation of Lat. 21. The Hellenistic Age. Rome from her origin to 395 A.D. Second semester (3).

Lat. 23. ROMAN LAW. Preliminary lectures on laws and customs of peoples anterior to the rise of Roman law. A study of the development of Roman law from the *Leges Regiae* to the codification by Justinian. Readings and discussions of select portions of the law comparing them with modern law. Some time is given to the influence of Roman law on modern nations. Open to sophomores, juniors, and seniors. Second semester (3).

Lat. 24. ROMAN POLITICAL INSTITUTIONS. A course dealing with the political institutions established and developed at Rome from the earliest times down to the reign of Diocletian. A descriptive and historical survey of political life at Rome and in its provinces by means of lectures, assigned readings, and special reports. Some consideration of titles and the duties of the state officials during the regal period, the republic, and the empire. Open to sophomores, juniors, and seniors. First semester (3).

Lat. 25. LATIN LITERATURE IN ENGLISH TRANSLATION. In this course the student undertakes a study of Latin literature by means of the best English translations. No knowledge of the Latin language is required. The lives of the most important authors are studied and their works read according to the major departments of literature,—history, comedy, epic, lyric, etc. At the same time emphasis is placed on the chronological development of the literature and the historical background necessary to the interpretation of the authors' works. Lectures and readings with special reports. Open to sophomores, juniors, and seniors. First or second semester (3).

Lat. 31. BEGINNING LATIN. Special emphasis on English derivatives and the principles of grammar. First semester (3).

Lat. 32. CAESAR. *The Gallic War*. Books I-IV. Prose composition and syntax. Second semester (3).

Lat. 33. CAESAR. One or two of the later books of the *Gallic War* or selections from the *Civil War*. CICERO. Orations. Prose composition and syntax, with special emphasis on clause con-

struction. A course designed for students who enter with two years of high school Latin and who elect to continue their Latin. First semester (3).

Lat. 34. CICERO. Continuation of Lat. 33. Orations: *de Senectute* or *de Amicitia*. Second semester (3).

For Advanced Undergraduates and Graduates

Lat. 105. SATIRE. Selected satires of Horace and Juvenal. Lectures on the history of Roman satire and its influence on modern literature. Study of social conditions under the empire. Prerequisites: Lat. 3 and 4. First semester (3).

Lat. 106. ROMAN PROSE WRITERS OF THE EMPIRE. Selections from the following: Petronius, *Cena Trimalchionis*; Apuleius. Cupid and Psyche story from the *Metamorphoses*; Suetonius, *Lives*; Seneca, *Moral Epistles* and *Dialogues*; Tacitus, *Germania*. Prerequisites: Lat. 3 and 4. Second semester (3).

Lat. 107. VERGIL. *Aeneid*, Books VII-XII. Continuation of Lat. 108. Second semester (3).

Lat. 108. LUCRETIVUS. The finest literary passages and selected passages illustrating his philosophy. ENNIUS and some study of early Roman epic. VERGIL's sixth *Aeneid*. An intensive study of its debt to Greek literature, religion, and philosophy, and its influence on modern literature. Lectures on the history of the epic; collateral reading in the great epics of other literatures. Prerequisites: Lat. 3 and 4. First semester (3).

Lat. 109. LATIN PROSE COMPOSITION. Exercises in translating from English into Latin, with a collateral study of Latin grammar. Special attention to clause construction and other points of syntax. Students preparing to teach Latin are expected to elect this course. Prerequisites: Lat. 3 and 4. First semester (3).

For Graduates

The prerequisites for graduate courses are four years of high school Latin and at least twenty-four semester hours of regular college Latin taken in an approved college or university.

Lat. 201. LATIN EPIGRAPHY. Text book supplemented by frequent use of the *Corpus Inscriptionum Latinarum* and the

standard texts of some of the longer inscriptions, illustrating Roman political institutions, public and private life, and religion. First semester (3). Professor Wright.

Lat. 202. TOPOGRAPHY AND MONUMENTS OF ANCIENT ROME. Lectures (usually illustrated) on the origin, growth, and destruction of ancient Rome and on modern methods of identifying extant monuments. Frequent reports based on a detailed study of the discoveries affecting individual sites. Second semester (3). Professor Wright.

Lat. 203. OVID'S FASTI. Substantially the whole of the *Fasti*. Lectures on the religion of ancient Rome and numerous reports on the various festivals treated in Ovid's poem and its sources. First semester (3). Professor Wright.

Lat. 204. OVID'S FASTI. Continuation of Lat. 203. Second semester (3). Professor Wright.

Lat. 205. ROMAN EPIC. Lectures on the history of epic poetry. Intensive study of the *Aeneid* of Vergil and its sources. First semester (3). Given in 1931-1932. Associate Professor E. L. Crum.

Lat. 206. ROMAN EPIC. Continuation of Lat. 205. Second semester (3). Given in 1931-1932. Associate Professor E. L. Crum.

MATHEMATICS AND ASTRONOMY

PROFESSORS FORT, OGBURN, REYNOLDS, AND SMAIL,
ASSOCIATE PROFESSORS STOCKER AND LAMSON,
ASSISTANT PROFESSORS TRJITZINSKY AND SHOOK,
MESSRS. BARNES, KEELER, KICHLINE, LEWIS, VAN ARNAM,
BEALE, CUTLER, STANLEY, AND SWAIN

The major in mathematics in the College of Arts and Science consists in all of at least twenty-four semester hours college credit in mathematics. It must include Math. 1, 2 (or 1a, 2a,) 3, 4, 5, 6, and 16, except that a student who has entrance credit in plane trigonometry does not take Math. 1, a student who has entrance credit in advanced algebra does not take Math. 2, and a student who has entrance credit in solid geometry does

not take Math. 16. The twelve hours advanced credit required by the regulations of the College must be from mathematics courses given at Lehigh University other than Math. 15, 16, 1, 2, 3, and 4.

The major in mathematics and astronomy consists of at least twenty-four semester hours college credit in mathematics and astronomy. It must include Math. 1, 2, (or 1a, 2a), 3, and 4 and Astr. 2 and 3, except that students having entrance credit in plane trigonometry or advanced algebra or solid geometry do not take Math. 1 or 2 or 16 as above. The twelve hours advanced credit required shall not include Math. 15, 16, 1, 2, 3, 4, or Astr. 1.

A student entering the freshman class in the College of Engineering normally takes Math. 2. If, however, he presents advanced algebra for entrance credit he enters Math. 3, substituting for Math. 2 at some time a mathematics course for which he has the prerequisites or some other free elective.

A placement examination is given each year during Freshman Week to all freshmen who present plane trigonometry and solid geometry for entrance. This examination stresses trigonometry but includes some questions on solid geometry. Students who do not make a reasonable showing on this examination are required to take Math. 1 instead of Math. 2.

MATHEMATICS

Math. 1. PLANE TRIGONOMETRY. Each semester (3).

Math. 1a. UNIFIED MATHEMATICS. This course is designed for incoming freshmen in the College of Arts and Science. Each semester (3).

Math. 2. ALGEBRA. Beginning with the theory of quadratic equations. Prerequisite: Math. 1, or entrance credit in plane trigonometry. Each semester (3).

Math. 2a. UNIFIED MATHEMATICS. Continuation of Math. 1a. Prerequisite: Math. 1a. Each semester (3).

Math. 3. ANALYTIC GEOMETRY. The usual elementary course treating among other things the straight line, the conic sections, and some three dimensional geometry. Prerequisite: Math. 2. Each semester (3).

Math. 4. **ELEMENTARY CALCULUS.** The formal rules of differentiation and of integration with simple applications. Prerequisite: Math. 3. Each semester (3).

Math. 5. **INTERMEDIATE CALCULUS.** Lengths, areas, and volumes of figures of revolution; double and triple integrals, centers of gravity, moments of inertia, etc. Prerequisite: Math. 4. Each semester (3).

Math. 6. **ADVANCED CALCULUS.** Taylor's Theorem in several variables, manipulation of power series, line and surface integrals, etc.; elementary differential equations. Prerequisite: Math. 5. Each semester (3).

Math. 15. **READING COURSE IN MATHEMATICS.** Credit not to exceed one hour per semester, total credit not to exceed three hours, approval of program and written report required.

Math. 16. **SOLID AND SPHERICAL GEOMETRY AND SPHERICAL TRIGONOMETRY.** Open to all students, particularly advised for students of astronomy. Each semester (3).

Math. 20. **ELEMENTARY MECHANICS.** Composition and resolution of forces, conditions of equilibrium for rigid bodies, friction, work, elementary kinematics and kinetics. Prerequisite: Math. 1. Each semester (4).

Math. 21. **ANALYTIC MECHANICS.** Differential equations of motion, treatment of forces in space, free and constrained motion of a particle and of masses, with applications to practical problems. Prerequisite: Math. 6. Each semester (3).

Math. 41. **MATHEMATICS OF FINANCE.** Annuities, sinking funds, amortization, etc., life insurance. Prerequisite: Math. 2 or 2a. First semester (3).

Math. 42. **MATHEMATICS OF STATISTICS.** Prerequisite: Math. 2 or 2a. Second semester (3).

Math. 43. **FIRST COURSE IN MATHEMATICS OF LIFE INSURANCE.** Mathematical theory of life contingency; preparation of life and monetary tables; computation of premiums for various life insurance policies; valuation of policies to meet statutory requirements; mathematical theory of risk and cost of insurance; computation of items for annual reports; valuation of

life annuities; computation of periodic premium for various life annuities. Prerequisite: Math. 41. First semester (3).

Math. 51. ADVANCED ALGEBRA. Complex numbers, theory of equations with applications to classical problems, Sturm's theorem, etc., determinants and the theory of resultants. Prerequisite: Math. 2 or 2a. One semester (3).

Math. 52. PROJECTIVE GEOMETRY. Fundamental ideas and theorems of this great geometric method. Prerequisite: Math. 3. One semester (3).

Math. 53. SECOND COURSE IN ANALYTIC GEOMETRY. More complete treatment of conic sections and higher plane curves than is possible in Math. 3. Additional work on solid analytic geometry. One semester (3).

Math. 54. HISTORY OF ELEMENTARY MATHEMATICS. Prerequisite: Math. 2 or 2a. One semester (3).

For Advanced Undergraduates and Graduates

Math. 101. VECTOR ANALYSIS. The theory and methods of vector analysis as applied in physics and pure mathematics. Prerequisite: Math. 6. First semester (3).

Math. 111. ADVANCED DIFFERENTIAL EQUATIONS. Special solvable nonlinear equations, linear equations, transformations and symbolic methods, solutions in series, Riccati's, Bessel's, and Legendre's equations, partial differential equations. Prerequisite: Math. 6. First semester (3).

Math. 112. ADVANCED DIFFERENTIAL EQUATIONS. Continuation of Math. 111. Fourier series, cylindrical and spherical harmonics. Second semester (3).

Math. 122. ADVANCED ANALYTIC MECHANICS. Prerequisite: Math. 21. First semester (3).

Math. 123. ADVANCED ANALYTIC MECHANICS. Continuation of Math. 122. Second semester (3).

Math. 124. THEORY OF ERRORS AND LEAST SQUARES AND EMPIRICAL FORMULAS. Probability and its relation to precision, development of the theory of least squares and its application in the study of errors, the formation of empirical formulas from given data. Designed for students engaged in experimen-

tal or observational work. Prerequisite: Math. 6. Second semester (3).

Math. 125. OPERATIONAL CALCULUS. The classical method of solution of the differential equations of the type used in the electrical circuit theory; various proofs of the superposition theorem, of the infinite integral theorem, and of the Heaviside expansion theorem; approximate methods; operators, their interpretation and application of a theorem of Borel; applications of the Fourier integral and transforms; fractional-order derivatives; series expansions of operators; Volterra's theorem; asymptotic series; Wiener's applications of a generalized Fourier integral to operational calculus; Paul Levy's treatment. The existing gaps in the theory are, whenever possible, remedied or pointed out. Numerous applications to electric circuit problems are stressed throughout the course. Prerequisite: Math. 111. One semester (3).

For Graduates

To major in the Department of Mathematics and Astronomy, and obtain a master's degree in one year, a graduate student must present evidence of having completed the equivalent of the work required in this department of graduates of the College of Arts and Science who majored in Mathematics or Mathematics and Astronomy. Graduate students who cannot satisfy these requirements but who desire to major in Mathematics or Mathematics and Astronomy may take preliminary courses for which they are prepared, but cannot expect to complete the requirements for a master's degree in one year.

Math. 200. FUNDAMENTAL CONCEPTS OF MATHEMATICS. (3). Professor Fort.

Math. 209. MATHEMATICS SEMINAR. Reports on special topics of the literature and of individual research. Prerequisite: graduate standing and consent of the instructor. (3). Professor Fort or Professor Reynolds or Professor Smail or Associate Professor Lamson.

Math. 210. MATHEMATICS SEMINAR. Continuation of Math. 209. (3). Professor Fort or Professor Reynolds or Professor Smail or Associate Professor Lamson.

Math. 211. INFINITE PROCESSES. Fundamental limit notions applied to various infinite processes. (3). Professor Fort or Professor Smail.

Math. 212. INFINITE PROCESSES. Continuation of Math. 211. (3). Professor Fort or Professor Smail.

Math. 215. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE. (3). Professor Fort or Professor Smail.

Math. 216. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE. Continuation of Math. 215. Prerequisite: Math. 215. (3). Professor Fort or Professor Smail.

Math. 217. THEORY OF ELASTICITY. Theory of stress and strain. Tension and thrust with applications. Bending of rods and plates. Equilibrium of curved rods, cylinders, and spheres. (3). Professor Reynolds.

Math. 218. THEORY OF ELASTICITY. Continuation of Math. 217. (3). Professor Reynolds.

Math. 219. SELECTED TOPICS IN QUANTUM MECHANICS AND RELATIVITY. Newton's equations; Lagrange's equations; Hamilton's equations; Hamilton's partial differential equation; the wave equation of optics; Schrödinger's work, with incidental introduction of characteristic functions of second order ordinary differential equations; the hydrogen atom in the normal state, and perturbed state; the theory of the Stark-effect in the new mechanics; the work of Dirac and others. The relativity part of the course will be of the conventional type. (3). Associate Professor Lamson.

Math. 220. SELECTED TOPICS IN QUANTUM MECHANICS AND RELATIVITY. Continuation of Math. 219. (3). Associate Professor Lamson.

ASTRONOMY

Astr. 1. DESCRIPTIVE ASTRONOMY. An elementary illustrated lecture course, open to all students. May not be substituted for Astr. 2. Second semester (3).

Astr. 2. GENERAL ASTRONOMY. Fundamental facts and principles of the subject with solution of problems using calculus; observatory visits. Prerequisite: Math. 4. First semester (3).

Astr. 3. PRACTICAL ASTRONOMY. Instruments used; methods of taking and reducing observations to determine time, latitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the theory studied. Prerequisites: Astr. 2 and Math. 5. Second semester (3).

For Graduates

Astr. 201. ASTRONOMY SEMINAR. The study of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in making and reducing observations. Prerequisite: Astr. 3. (3). Professor Ogburn.

Astr. 202. ASTRONOMY SEMINAR. Continuation of Astr. 201. (3). Professor Ogburn.

MECHANICAL ENGINEERING AND INDUSTRIAL ENGINEERING

PROFESSORS F. V. LARKIN, KLEIN, BUTTERFIELD, AND STUART,
ASSISTANT PROFESSORS JENNINGS AND LUCE,
MESSRS. CONNELLY AND THOM

MECHANICAL ENGINEERING

M.E. 1. ELEMENTARY MACHINE DESIGN. A course in the analysis of stresses and practical applications in the design of machine elements, such as shafts, keys, couplings, bearings, connecting rods, riveted joints, etc., with sufficient drawing room work to teach the correct method of detailing and dimensioning original designs. Prerequisite: Math. 20. First semester (3).

M.E. 2. ELEMENTARY HEAT ENGINES. Fuels, combustion, steam boilers and furnaces, properties of steam, power plant auxiliaries, heat engine cycles, steam engines, steam turbines, internal combustion engines. Prerequisites: Chem. 1, Phys. 1. First semester (3).

M.E. 4. ELEMENTARY MACHINE DESIGN. A continuation of M.E. 1, including the design of gears, worm gearing, belts, pulleys, flywheels, brakes, etc. Prerequisite: Math. 20. Second semester (3).

M.E. 5. HEAT ENGINES. Continuation of M.E. 2. Prerequisites: Chem. 1, Phys. 1. Second semester (3).

M.E. 6. MECHANISM. A study of the kinematic relations of machine parts. Determination of the relative motion of links in a mechanism; development of cams, gears, and transmission machinery from the standpoint of motion only; practical problems developed in the drawing room. Also a study of force relations in simple machines; the determination of certain forces when others are given; the determination of efficiencies carried on in the drawing room by means of a series of previously prepared plates. Prerequisite: Math. 20. Second semester (4).

M.E. 9. ENGINEERING LABORATORY. Use and calibration of instruments, elementary tests on steam engines, pumps, and boilers. Prerequisite: M.E. 2. Fee, \$3.50. First semester (1).

M.E. 10. THERMODYNAMICS. Principles of engineering thermodynamics. Energy equations, entropy, properties of steam and gases, flow of fluids. Application of principles to practical problems. Prerequisite: M.E. 2 or equivalent. Each semester (3).

M.E. 11. ENGINEERING LABORATORY. Continuation of M.E. 9. Laboratory experiments on flow of fluids, tests of steam engines, turbines, air compressors, heat transfer equipment, internal combustion engines. Prerequisite: M.E. 2. Fee, \$3.50. Second semester (1).

M.E. 15. THESIS. Candidates for the degree of B.S. in M.E. may, with the approval of the department, undertake a thesis as a portion of the work during the second semester of the senior year. Prerequisites: C.E. 9, M.E. 10. Second semester (3).

M.E. 19. ENGINEERING LABORATORY. A one semester course for non-mechanical students, covering principles of measurements, tests of boilers, steam engines, steam turbines, air compressors, internal combustion engines. Prerequisite: M.E. 29 or equivalent. Fee, \$3.50. First or second semester (1).

M.E. 21. ENGINEERING LABORATORY. For non-mechanical students. Use and calibration of instruments, tests of steam en-

gines, steam turbines, boilers, air compressors, internal combustion engines, pumping equipment. Prerequisite: M.E. 29, or equivalent. Fee, \$3.50. First semester (1).

M.E. 22. HEAT ENGINES. Short course covering steam engines, steam turbines, internal combustion engines, and boiler plants. Prerequisite: Chem. 1. First semester (3).

M.E. 23. HEAT ENGINES. Completion of M.E. 22. Prerequisite: Chem. 1. Second semester (3).

M.E. 24. ENGINEERING LABORATORY. Use and calibration of instruments, tests of heat transfer apparatus, prime movers, refrigeration machinery, and power plants in the neighborhood. Prerequisite: M.E. 29 or equivalent. Fee, \$3.50. Summer session: eight hours of laboratory work each week-day for four weeks, beginning June 2, 1931. Tuition fee, \$40.00. (4).

M.E. 25. ENGINEERING LABORATORY. Completion of M.E. 21, along the same lines. Prerequisite: M.E. 22 or equivalent. Fee, \$3.50. Second semester (1).

M.E. 29. HEAT ENGINES. A one semester course for non-mechanical students covering the elementary principles of power plants and auxiliaries. Prerequisites: Chem. 1, Phys. 1. First or second semester (3).

M.E. 30. MECHANISM. A study of the kinematic relations of machine parts. Determination of the relative motion of links in a mechanism; development of cams, gears, and transmission machinery from the standpoint of motion only; practical problems developed in the drawing room. Prerequisite: Math. 20. First semester (3).

For Advanced Undergraduates and Graduates

Graduate students desiring to take the following courses should present as prerequisites: integral calculus, mechanics of materials, and elementary heat engines.

M.E. 108. HEAT ENGINES. Continuation of M.E. 10. Thermodynamic analyses of the following: power plant cycles, steam engine, combustion, compressors, steam turbine, internal combustion engine, refrigeration. Prerequisite: M.E. 2 or equivalent. Second semester (3).

M.E. 112. ADVANCED MACHINE DESIGN. The design of machines in general with special attention to the application of underlying fundamentals in strength to specific problems, practical considerations and the use of standards. Problems covering such machines as hoists, machine tools, hydraulic machines, etc., are worked in a drawing room conducted on the lines of a modern commercial drafting room. Prerequisites: M.E. 4, C.E. 9. First semester (4).

M.E. 113. MECHANICAL ENGINEERING. Advanced work in thermodynamics, internal combustion engines, steam turbines, with typical problems. Prerequisite: M.E. 10. First semester (3).

M.E. 114. ENGINEERING LABORATORY. Work of M.E. 9 and 11 continued. Tests of boilers, power plants, and pumping stations in the neighborhood. Prerequisite: M.E. 9. Fee, \$3.50. First semester (2).

M.E. 116. ADVANCED MACHINE DESIGN. A continuation of M.E. 112, with special emphasis on the effect of eccentric loading and inertia forces on the dimensions of machine parts. Prerequisites: M.E. 4, C.E. 9. Second semester (4).

M.E. 117. MECHANICAL ENGINEERING. Continuation of M.E. 113. Advanced work in refrigeration, heating and ventilation with typical problems. Prerequisite: M.E. 10. Second semester (3).

M.E. 118. ENGINEERING LABORATORY. Work of M.E. 114 carried forward along the same lines. Analysis of flue gases; complete tests of power plants in the vicinity. Prerequisite: M.E. 9. Fee, \$3.50. Second semester (2).

M.E. 119. GENERAL AERONAUTICS. A theoretical course in aerostatics, aerodynamics, aeronautical power plants and aeronautical navigating instruments. Prerequisite: senior standing in the college of engineering. First semester (3).

M.E. 120. GENERAL AERONAUTICS. A continuation of M.E. 119 with same prerequisite. Second semester (3).

Students taking any of the courses in Engineering Laboratory are subject to call for duty on a maximum of one twenty-four hour test per semester.

For Graduates

Math. 217 and 218, Theory of Elasticity, may be included in a graduate major in Mechanical Engineering.

M.E. 200. ADVANCED ENGINEERING THERMODYNAMICS. The development of certain methods of thermodynamics which find particular application in the field of mechanical engineering. Energy equations; availability and entropy; general equations; formulation of vapor properties; action of steam in nozzles and turbines; supersaturation; gas properties; gas reactions in combustion. Prerequisite: graduate standing in engineering. First semester (3). Professor Stuart.

M.E. 201. ADVANCED ENGINEERING THERMODYNAMICS. Continuation of M.E. 200. Second semester (3). Professor Stuart.

M.E. 203. INTERNAL COMBUSTION ENGINES. History; laws of mixing, carburation, atomization, combustion and chemical equilibrium; heat losses; friction losses; governing; gas engine cycles; vibration and balancing engine types. Prerequisite: M.E. 10. First semester (3). Professor Butterfield.

M.E. 204. INTERNAL COMBUSTION ENGINES. Continuation of M.E. 203. Second semester (3). Professor Butterfield.

M.E. 207. STEAM TURBINES. Theory of the steam turbine, with discussion and analysis of the important formulas and diagrams relating thereto; classification; discussion of the more important types; analysis by means of equations and diagrams; operation and governings; principles underlying the design of turbine parts; critical velocities. Prerequisite: graduate standing in engineering. First semester (3). Professor Klein.

M.E. 208. STEAM TURBINES. Continuation of M.E. 207. Prerequisite: graduate standing in engineering. Second semester (3). Professor Klein.

INDUSTRIAL ENGINEERING

I.E. 1. INDUSTRIAL EMPLOYMENT. Following the junior year, students are required to do a minimum of eight weeks of practical work, preferably as student apprentices, in the work

they plan to follow after graduation. A report, typewritten and bound, is required. Prerequisite: sophomore standing.

I.E. 2. INDUSTRIAL MANAGEMENT. A course in the essential problems of organization, financial administration, plant layout, production control, and employment policies of industrial enterprises. Prerequisites: Bus. 3 and 4. First semester (3).

I.E. 3. INDUSTRIAL MANAGEMENT. Continuation of I.E. 2. Prerequisites: Bus. 3 and 4. Second semester (3).

In I.E. 1 and I.E. 2 a maximum of three half-day inspection trips per semester are required.

I.E. 4. INDUSTRIAL POWER. Application of the principles of thermodynamics to the design and operation of steam power plants, internal combustion engines, compressors, and refrigeration. Includes one afternoon period weekly devoted to engineering laboratory and inspection and tests of plants in the vicinity of the University. Prerequisites: Math. 5, M.E. 10. Second semester (3).

I.E. 5. THESIS. Candidates for the degree of B.S. in Industrial Engineering, may, with the approval of the department, undertake a thesis as a portion of the work of the second semester of the senior year. Prerequisites: C.E. 9, Bus. 11. Second semester (3).

METALLURGICAL ENGINEERING

PROFESSOR STOUGHTON, ASSOCIATE PROFESSOR BUTTS,
ASSISTANT PROFESSOR DOAN, MR. HARVEY

Met. 1. GENERAL METALLURGY. A course of lectures discussing the apparatus and general principles of metallurgy. Ores, fuels, combustion, pyrometry, refractories, furnaces, metallurgical processes and products, metals and alloys, slags and fluxes, blast and gases, smoke and fume. Prerequisites: Chem. 1 or 3, Phys. 1, Math. 20. First semester (2).

Met. 2. METALLURGY OF IRON AND STEEL. Chemical and physical properties of iron. Iron ores, preparation of ores, the blast furnace, the mixer, remelting, refining, puddling, the Bessemer process, the open-hearth process, duplex process,

cementation, manufacture of crucible steel, electric steel, alloy steels, casting, forging, and heat treatment. Prerequisite: Met. 1. Second semester (2).

Met. 3. METALLURGY OF COPPER, LEAD, GOLD, AND SILVER. COPPER: Chemical and physical properties, ores, smelting sulphide ores, the Bessemer process, treatment of oxide ores, wet process, electrolytic processes. LEAD: Chemical and physical properties, ores, smelting processes, condensation of lead fume, refining and desilverization of base bullion. GOLD: Chemical and physical properties, ores, gold washing, gold milling, amalgamation, the cyanide process, parting and refining gold and silver. SILVER: Chemical and physical properties, ores, smelting, amalgamation, leaching processes. A two-day inspection trip (expense about \$15.00) is required. Prerequisite: Met. 1. First semester (2).

Met. 4. METALLURGY OF ZINC, ALUMINUM AND THE MINOR METALS. ZINC: Chemical and physical properties, ores, reduction by furnace and electrolytic processes, electrothermic processes, manufacture of zinc oxide. MERCURY: Chemical and physical properties, ores, processes of extraction. ALUMINUM: Chemical and physical properties, ores, extraction by electrolysis. TIN, NICKEL, PLATINUM, ANTIMONY, etc.: Chemical and physical properties, ores, processes of extraction. A one-day inspection trip (expense about \$3.00) is required. Prerequisite: Met. 1. Second semester (2).

Met. 5. ELECTROCHEMISTRY. Lectures and recitations concerning the phenomena of electrolysis and electrolytic conduction; current phenomena; voltage phenomena; energy relations; electrode reactions; the electrolytic cell; primary cells and storage batteries; electric arcs and discharges through gases. Prerequisites: Chem. 20, Phys. 6. First semester (1).

Met. 21. ENGINEERING METALLURGY. An abridgment of Met. 1, 2, 3, and 4, especially adapted to the viewpoint of users of metals. Prerequisite: Chem. 1. First or second semester (2).

Met. 23. FERROUS METALLURGY. Especially adapted from Met. 21 for students taking the curricula in Chemistry and

Chemical Engineering. Prerequisite: Chem. 1. First semester (2).

Met. 24. SHORT COURSE IN NON-FERROUS METALLURGY. Continuation of Met. 23. Prerequisites: Phys. 4 and 6. Second semester (2).

Met. 25. ELECTROCHEMISTRY AND ELECTROMETALLURGY. Lectures and recitations concerning the phenomena of electrolysis and electrolytic conduction; current phenomena; voltage phenomena; energy relations; electrode reactions; the electrolytic cell; primary cells; and storage batteries; electric arcs and discharges through gases; electrothermics; practical applications of electricity to metallurgical processes. Prerequisites: Chem. 20, Met. 21, Phys. 6. First semester (2).

Met. 33. METALLURGICAL LABORATORY. The internal structure of metals and industrial alloys; effect of cold rolling and annealing. Heat treatment of alloys and case-hardening of steels. Foundry experiments. Fatigue and corrosion testing of metals. Electric arc welding. Use of instruments and apparatus employed in metallurgical work, such as pyrometers, hardness testing machines, microscopes, gas and electric furnaces, etc. Prerequisites: Phys. 4 and 6 (Phys. 4 may be taken concurrently). Fee, \$5.00. First or second semester (1).

Met. 34. METALLURGICAL LABORATORY. Continuation of Met. 33. Fee, \$5.00. Second semester (1).

Met. 35. ELECTROCHEMICAL LABORATORY. Quantitative relations in the deposition of metals by electrolysis. Experimental study of the conditions controlling the nature of electrolytic deposits, electrolysis of fused salts, cathodic and anodic reactions. Must accompany Met. 25. Fee, \$5.00. First semester (1).

Met. 44. METALLURGICAL PLANT VISITS. Visits of inspection and study to plants extracting, refining, working, fabricating, treating, or otherwise producing or utilizing metallic bodies in a metallurgical sense. Written reports of visits are required and occasional quizzes on observations made. Second semester (1).

Met. 46. METALLURGICAL PLANT VISITS. Continuation of Met. 44. Second semester (1).

Met. 48. SUMMER WORK. At the end of the sophomore year, eight weeks' practical experience in industrial plants is required of students who do not take Chem. 39 or M.S.T. 9 or 19.

Met. 49. SUMMER WORK. At the end of the junior year students in the curriculum in Metallurgical Engineering are required to secure in industrial plants at least eight weeks' practical experience.

Met. 61. PROBLEMS IN GENERAL METALLURGY. A course of problems embodying the use of physical, chemical, and mechanical principles as the basis of practical metallurgy. Data are taken, as far as possible, from actual practice, so that the results have an important bearing in the understanding of metallurgical processes. Prerequisites: Chem. 8, and Met. 1 or 21 or 23. Prerequisite: Chem. 8. Second semester (1).

Met. 62. PROBLEMS IN IRON AND STEEL METALLURGY. A course of problems involving the fundamental principles of the various processes in the metallurgy of iron and steel, to give the student an understanding of the quantitative relationships in the processes. Prerequisites: Met. 1 and 61. Must accompany Met. 2. Second semester (1).

Met. 81. SHORT COURSE IN METALLURGICAL ENGINEERING PROBLEMS. An abridgment of Met. 61 and 62. Prerequisites: Chem. 1 or 3, and 8, Phys. 1, Math. 20. Must accompany Met. 21. First or second semester (1).

Met. 83. SHORT COURSE IN METALLURGICAL ENGINEERING PROBLEMS. Same as Met. 81, but adapted for students taking the curriculum in Chemical Engineering. Prerequisites: Chem. 1 or 3, and 8, Phys. 1, Math. 20. Must accompany Met. 23. First semester (1).

Met. 84. SHORT COURSE IN NON-FERROUS METALLURGICAL PROBLEMS. An abridgment of Met. 163 and 164. Must accompany Met. 24. Prerequisites: Met. 61, 81 or 83. Second semester (1).

For Advanced Undergraduates and Graduates

Met. 106. ELECTROMETALLURGY. Lectures discussing the practical application of electricity to metallurgical processes. Elec-

trolytic and electric furnace plants and practice. Prerequisites: Met. 1 and 5. Second semester (1).

Met. 130. PHYSICAL METALLURGY. Physical structure and constitution of metals and alloys; effect thereon of mechanical working, heat treatment, composition, etc.; including polishing and examination of microsections and an introduction to metallography. Lectures and laboratory work. Prerequisites: Met. 1 or 21 or 23. Fee, \$5.00. Second semester (3).

Met. 131. METALLOGRAPHY. Continuation of Met. 130. Study of the structure of metals and alloys, particularly the important industrial alloys such as steel, cast iron, brass, duralumin, etc., with the microscope and other apparatus. The influence of thermal and mechanical treatment on properties and structure. Lectures and laboratory work. Prerequisites: Met. 1 and 2 or Met. 130. Fee, \$5.00. First semester (3).

Met. 132. METALLURGICAL LABORATORY. Principles of process metallurgy, such as alloying, galvanizing, measurement of air volume and moisture content, desilverization of lead, cementation of steel, electrolysis, hydrometallurgy, heat transfer, heat conduction, and radiation. Principles of physical metallurgy, such as the effect of mechanical work and heat treatment, influence of impurities, etc. Calibration and use of instruments employed in metallurgical investigations, pyrometers, calorimeters, etc. Determination of efficiencies of furnaces. Experiments with electrochemical processes, electric furnaces, etc. Prerequisites: Met. 3, 25, and 130 or 131. Fee, \$15.00. Second semester (2).

Met. 139. SEMINAR. Conference hours of the staff of the department with students, to discuss current metallurgical literature, processes, and problems; involving reading of current English and foreign literature and verbal presentation by the students. Training in the preparation and writing of engineering reports. First semester (2).

Met. 140. SEMINAR. Continuation of Met. 139. Second semester (1).

Met. 152. ADVANCED METALLURGY OF IRON AND STEEL. Continuation of Met. 2 for seniors and graduate students. Prerequisite: Met. 2. Second semester (2).

Met. 153. ADVANCED METALLURGY OF IRON AND STEEL. Prerequisite: Met. 2 and the approval of the department head. First semester (1).

Met. 154. ADVANCED METALLURGY OF IRON AND STEEL. Prerequisite: Met. 153 and the approval of the department head. First or second semester (1).

Met. 163. PROBLEMS IN THE METALLURGY OF COPPER, LEAD, GOLD, AND SILVER. A course of problems concerned with the principles utilized in the metallurgy of copper, lead, silver, and gold. Prerequisite: Met. 61. Must accompany Met. 3. First semester (1).

Met. 164. PROBLEMS IN THE METALLURGY OF ZINC, ALUMINUM, AND THE MINOR METALS. A course of problems concerned with the principles utilized in the metallurgy of zinc, aluminum, etc. Prerequisite: Met. 61. Must accompany Met. 4. Second semester (1).

Met. 172. ADVANCED PHYSICAL METALLURGY. A broad course including advanced study in the fundamental fields with a review of the current literature as the study in each field is concluded. Prerequisites: Met. 130 and 131. First semester (2).

Met. 173. ADVANCED PHYSICAL METALLURGY. Continuation of Met. 172. Prerequisite: Met. 2. Second semester (2).

For Graduates

Met. 201. METALLURGICAL INVESTIGATION AND THESIS. Study of the literature and investigation of some special metallurgical problems, such as: an improvement or innovation in some metallurgical process; the establishment of an equilibrium diagram of a series of alloys; the effect of heat treatment on a metal or alloy; or some other contribution to metallurgical knowledge, or else confirmation of knowledge not yet fully established. The study and investigation must be embodied in a written report. Prerequisites: Met. 2, 3, or 4. Both semesters (6). Professor Stoughton or Associate Professor Butts or Assistant Professor Doan.

Met. 202. METALLURGICAL INVESTIGATION AND THESIS. Continuation of Met. 201. Both semesters (3). Professor Stoughton or Associate Professor Butts or Assistant Professor Doan.

MILITARY SCIENCE AND TACTICS

COLONEL THOMLINSON, CAPTAINS CLAY, SADLER,

KECK, AND RICE, LIEUTENANT EMERY,

SERGEANTS LAVIN, MOHRING, AND GASDA

An infantry unit of the Reserve Officers' Training Corps was established at Lehigh University in September, 1919. Conducted on a voluntary basis during the year 1919-1920, the unit had a membership of 313 students. A year later the Trustees and Faculty of the University made the Basic Course, Military Science and Tactics, a required subject, under the R.O.T.C. regulations, for physically fit freshmen and sophomores. Provision for this training is made in their schedule of study.

An ordnance unit was established at this University in September, 1925. For Basic Ordnance students the course is the same as for Basic Infantry. For Advanced Ordnance, students in the College of Engineering are eligible, preference being given to those in Mechanical, Chemical, Metallurgical, and Electrical Engineering.

The military courses included under the War Department regulations consist of two years of basic work and two years of advanced work along specialized lines. Students who complete the four-year course satisfactorily become eligible for commissions as second lieutenants in the Officers' Reserve Corps.

Uniform and equipment are furnished by the Government; each student must provide suitable shoes and belt. Each student to whom government property is issued is required to make a cash deposit of \$25.00, which is refunded in full upon the return of the property in good condition; this deposit is payable at the time of registration for the first semester. During the advanced course students are paid commutation of subsistence, amounting to approximately \$9.00 a month. The number of students who may take the advanced course is limited by the annual appropriations.

Infantry students make an inspection trip to Gettysburg battle field in the spring of the senior year. Ordnance students make an inspection trip to Picatinny Arsenal in the spring of the junior year and to Frankford Arsenal in the fall of the senior year.

Infantry Unit

Mil. 1. BASIC COURSE. First Year. Fundamental military training common to all arms of the service. Theoretical and practical instruction in marksmanship, military courtesy, military hygiene and first-aid, physical drill, and command and leadership. Three hours a week. First semester (2).

Mil. 2. BASIC COURSE, First Year. Continuation of Mil. 1. Second semester (2).

Mil. 3. BASIC COURSE, Second Year. Fundamental military training common to all arms of the service. Theoretical and practical instruction in drill and command, musketry, automatic rifle, scouting and patrolling, and combat principles of rifle squad. Students who indicate suitable proficiency in this course are appointed corporals in the R.O.T.C. Unit. Three hours a week. First semester (2).

Mil. 4. BASIC COURSE, Second Year. Continuation of Mil. 3. Second semester (2).

Mil. 5. ADVANCED COURSE, INFANTRY, First Year. Theoretical and practical instruction in drill and command, military sketching, map reading, infantry weapons (machine gun, 37 mm. and 3 in. trench mortar), combat principles, rifle and machine gun section and platoon. Students who indicate suitable proficiency in this course are appointed sergeants in the R.O.T.C. Unit. Five hours a week. First semester (3).

Mil. 6. ADVANCED COURSE, INFANTRY, First Year. Continuation of Mil. 5. Second semester (3).

Mil. 7. ADVANCED COURSE, INFANTRY, Second Year. Theoretical and practical instruction in field engineering, principles of camouflage, organized Reserve Corps regulations, administration, military history and national defense act, combat principles, tactical exercises, map problems, command and leadership, and military law. Students who indicate suitable proficiency in this course are appointed commissioned officers in the R.O.T.C. Unit. Five hours a week. First semester (3).

Mil. 8. ADVANCED COURSE, INFANTRY, Second Year. Continuation of Mil. 7. Second semester (3).

Mil. 9. **ADVANCED CAMP, INFANTRY.** Compulsory for students who elect the advanced course. Generally held in summer between junior and senior years. (3).

Ordnance Unit

Mil. 11. **BASIC COURSE, First Year.** Same as Mil. 1. First semester (2).

Mil. 12. **BASIC COURSE, First Year.** Continuation of Mil. 11. Same as Mil. 2. Second semester (2).

Mil. 13. **BASIC COURSE, Second Year.** Same as Mil. 3. First semester (2).

Mil. 14. **BASIC COURSE, Second Year.** Continuation of Mil. 13. Same as Mil. 4. Second semester (2).

Mil. 15. **ADVANCED COURSE, ORDNANCE. First Year.** Five hours a week, three hours of which are credited to technical courses in the regular engineering curricula. Two hours' instruction weekly is given in the following military subjects: materiel, ammunition and explosives, current ordnance problems. Students who indicate suitable proficiency in this course are appointed sergeants in the R.O.T.C. Unit. First semester ($1\frac{1}{2}$).

Mil. 16. **ADVANCED COURSE, ORDNANCE, First Year.** Continuation of Mil. 15. Second semester ($1\frac{1}{2}$).

Mil. 17. **ADVANCED COURSE, ORDNANCE, Second Year.** Five hours a week, three hours of which are credited to technical courses in the regular engineering curricula. Two hours' instruction weekly is given in the following military subjects: property accounting and ordnance financial procedure, military law, administration, and supply, organization of the Ordnance Department, industrial mobilization, current ordnance problems, elementary ordnance engineering. Students who indicate suitable proficiency in this course are appointed student commissioned officers, and upon graduation are appointed second lieutenants in the Ordnance Officers' Reserve Corps. First semester ($1\frac{1}{2}$).

Mil. 18. **ADVANCED COURSE, ORDNANCE, Second Year.** Continuation of Mil. 17. Second semester ($1\frac{1}{2}$).

Mil. 19. ADVANCED CAMP, ORDNANCE. Compulsory for students who elect the advanced course. Generally held in summer between junior and senior years. (3).

Mil. 20. ADVANCED ORDNANCE. Drill and command. Elective for students taking Mil. 15. First semester ($\frac{1}{2}$).

Mil. 21. ADVANCED ORDNANCE. Continuation of Mil. 20. Second semester ($\frac{1}{2}$).

Mil. 22. ADVANCED ORDNANCE. Continuation of Mil. 21. First semester ($\frac{1}{2}$).

Mil. 23. ADVANCED ORDNANCE. Continuation of Mil. 22. Second semester ($\frac{1}{2}$).

MINING ENGINEERING

PROFESSOR ECKFELDT, ASSOCIATE PROFESSOR SINKINSON

Mine. 1. MINING ENGINEERING. Prospecting: modes of occurrence of minerals; uses of geology; prospecting for placers, veins, and beds; magnetic prospecting; drilling; sampling; valuation of property; location of claims; patenting mining ground. Boring: uses of bore-holes; methods, by percussion and rotation; survey of bore-holes. Transportation: haulage; surface and underground methods; ropes, motors, and cars; aerial tramways; loading and unloading; storage of mineral; transportation of workmen; mine tracks; signaling; hoisting: motors, ropes, receptacles; safety appliances; systems of hoisting. First semester (3).

Mine. 2. MINING METHODS. Exploitation: methods of working deposits; location of surface plant; rock-drilling, tools and machines; air compressors; use of explosives and blasting; safety regulations; quarrying; tunneling, slope and shaft sinking; timbering; support of excavations by wood, steel, and concrete; methods of mining; stripping; hydraulicizing; dredging; room and pillar; longwall; stoping; filling; caving; top-slicing; robbing. Coal cutting machinery. Conveyors. Mechanical loaders. First semester (3).

Mine. 3. ORE DRESSING; COAL PREPARATION; LABORATORY. General principles and physical properties upon which the recovery of minerals from ores is based, followed by detailed

study of machines and apparatus used for coarse and fine crushing; classifying and preparation for concentration; various methods of concentration, including gravity and magnetic methods, oil flotation, etc. Study of procedure followed for treatment of ores in typical concentrating plants; visits to mills; experimental work in ores, giving practical application of principles and processes covered. General principles of concentration applied to the preparation of coal. Visits to breakers and coal washers. A well-equipped laboratory gives opportunity for individual as well as class operation of machines and apparatus. Fee, \$5.00. First semester (3).

Mine. 5. MINING ENGINEERING. Drainage: surface water, prevention of access; mine dams; tunnel drainage; mechanical drainage, water-hoisting, pumping, classes of pumps. Ventilation: mine air; vitiation of air; natural and mechanical methods of ventilation; systems, multiple entry, splitting; ventilating machines, fans and blowers; testing air; ventilation laws. Lighting: methods in use, safety lamps, electric lighting; safety regulations. First aid: causes of accidents, means of prevention, rescue work; first aid to injured; hygiene of mines. Railroad construction: earthwork, culverts, retaining walls, piling, tunnels, trestles, bridges, track-work; railroad structures. Second semester (3).

Mine. 6. MINE SURVEYING. Forms for keeping notes; surface surveys; determination of true meridian, latitude, and time from observations on Polaris and sun; connecting surface surveys with mine surveys through tunnels, slopes, and shafts; calculation of notes; mine mapping; mine problems; practice in mine surveying. Mine railroads: preliminary and location surveys; theory of curves; railroad mapping; calculation of earthwork; curve and compensation problems; practice in railroad surveying. Prerequisite: C.E. 6. Second semester (3).

Mine 7. CONSTRUCTION. The use of stone, brick, concrete, and wood as structural material for foundations, piling, dams, retaining walls, mine buildings, railroads, trestles, tipples, ore bins, etc. First semester (2).

Mine. 8. OIL FIELD PRACTICE. Distribution of petroleum and natural gas; valuation of oil lands. Location of wells; de-

velopment-drilling and production methods. Transportation; storage; fires; avoidable waste and conservation of oil and gas resources. Refining methods; casing-head gasoline. Second semester (2).

Mine 9. MINE ADMINISTRATION. Organization, employment of labor, management; principles of mining. Second semester (1).

Mine. 10. FUEL TECHNOLOGY. Economic, statistical, scientific aspects. Fuel resources. Analysis of fuels, including gas analysis. Calorimetry; pyrometry; radiometry. Classification of fuels. Colloidal fuels. M.E. students take certain parts of this course. First semester (2).

Mine. 11. FUEL TECHNOLOGY. Theoretical aspects and practice in the utilization of fuels, with the incidental methods of laboratory investigation. Chemical composition of fuels; carbonization at low and high temperatures; complete gasification of fuels, with laboratory practice. Second semester (2).

Mine. 20. SUMMER WORK. Industrial employment for eight weeks, following the junior year, with report.

For Graduates

Students desiring to do graduate work in Mining Engineering should consult with the Professor of Mining Engineering with regard to their qualifications.

Mine. 201. METHODS OF MINING. The study of methods used in a given mining region, or in the production of a given class of materials, with respect to conditions influencing choice of method and cost. First semester (5). Professor Eckfeldt.

Mine. 202. METHODS OF MINING. Continuation of Mine. 201. Second semester (5). Professor Eckfeldt.

Mine. 203. MINING PLANT. The determination of the efficiency of mining machinery of given types under varying conditions. First semester (5). Professor Eckfeldt.

Mine. 204. MINING PLANT. Continuation of Mine. 203. Second semester (5). Professor Eckfeldt.

Mine. 205. ORE-DRESSING AND COAL WASHING PLANT. The study of certain operations incident to the dressing of ores or

the preparation of coal. Determination of efficiency of machines and processes. Losses in dressing. First semester (5). Associate Professor Sinkinson.

Mine. 206. ORE-DRESSING AND COAL WASHING PLANT. Continuation of Mine. 205. Second semester (5). Associate Professor Sinkinson.

Mine. 207. FUEL TECHNOLOGY RESEARCH. Physical and chemical investigations of coals and fuel oils; gas analysis; ignition phenomena; mechanism of combustion; surface combustion; heat recuperation. General study of methods employed in carbonizing coal between 500° and 1200° C., including recovery of byproducts; coal-gas and coking industries. First semester (4). Associate Professor Sinkinson.

Mine. 208. FUEL TECHNOLOGY RESEARCH. Continuation of Mine. 207. Second semester (4). Associate Professor Sinkinson.

MUSIC

MR. SHIELDS

Mus. 1. HISTORY, APPRECIATION, AND HARMONY. A study of the development of music from ancient times to our present time, the forms and types of music in their historical settings with illustrations, and a study of our chordal system and usual chord progressions. First semester (3).

Mus. 2. HISTORY, APPRECIATION, AND HARMONY. Continuation of Mus. 1. Second semester (3).

PHILOSOPHY, PSYCHOLOGY, AND EDUCATION

PROFESSOR HUGHES,

ASSISTANT PROFESSORS DROWN, F. C. BECKER, AND GRAHAM,

MESSRS. STONE, HARRIS, AND LAFFERTY,

DRS. HOFFMAN AND KLOPP (LECTURERS)

PHILOSOPHY

Phil. 1. HISTORY OF PHILOSOPHY, ANCIENT AND MEDIAEVAL. A careful study of Plato's *Republic* and other source-material. Lectures on the philosophy of the Middle Ages. Discussions and recitations. First semester (3).

Phil. 2. HISTORY OF PHILOSOPHY, MODERN. A study of modern philosophical thought through selected readings. Discussions and lectures. Second semester (3).

Phil. 3. INTRODUCTION TO PHILOSOPHY. The problems that experience and science present for the application of philosophic method. Each semester (3).

Phil. 5. PHILOSOPHY OF RELIGION. A study of the function and definition of religion. First semester (1).

Phil. 6. PHILOSOPHY OF RELIGION. A study of important teachings of the world religions from the standpoint of philosophy. Prerequisite: Phil. 5. Second semester (1).

Phil. 11. PRESENT-DAY ETHICAL PROBLEMS. Problems presented by contemporary social conditions. Reading and discussion. Each semester (1).

Phil. 12. PRESENT-DAY ETHICAL PROBLEMS. Problems of the individual life-career. Discussions. Prerequisite: Phil. 11. Second semester (1).

Phil. 14. LOGIC AND SCIENTIFIC METHOD. Formal logic; mathematical logic; inductive method. Discussions. Second semester (3).

Phil. 15. THE THEORY OF CONDUCT. Criteria of right living, which are examined in the light of past and of present standards. The bases of ethical standards. Prerequisite: three hours in philosophy. Second semester (3).

Phil. 16. THE THEORY OF NATURE. An examination of current scientific methods and results in the light of their development, with a view to reaching some unitary or consistent understanding of natural processes. Prerequisite: three hours in philosophy. Not given in 1932-1933. First semester (3).

Phil. 17. CURRENT PHILOSOPHICAL ISSUES. An examination of the theoretical assumptions that underlie the more important treatises now appearing in the fields of individual and social ethics, and of cosmical and theological speculation. The study deals with works that have a general and somewhat popular interest, and requires no previous study of philosophy. Prerequisite: junior standing or the consent of the head of the department. First semester (3).

READING IN PHILOSOPHY. Qualified students may pursue a course of reading in philosophy in connection with the major study in Philosophy. Professor Hughes, Assistant Professor Becker, Dr. Lafferty.

For Advanced Undergraduates and Graduates

Phil. 107. SEMINAR IN CONTEMPORARY PHILOSOPHY. Each year a topic will be chosen, upon which the professor will present a course of lectures. Each student will select a division of this general topic for his study and report, and will present a paper upon that topic and pass an examination in the subject of the seminar. Prerequisites: two of the following courses: Phil. 1, 2, 3, or 14. Not given in 1932-1933. First semester (3).

Phil. 108. SEMINAR IN CONTEMPORARY PHILOSOPHY. This is conducted similarly to Phil. 107. Not given in 1932-1933. Second semester (3).

Phil. 109. THE THEORY OF ART AND OF BEAUTY. The chief philosophical works in this field are studied, including some recent publications. Considerable attention is paid to the psychology of appreciation. Prerequisite: six hours in philosophy. Not given in 1932-1933. First semester (3).

Phil. 110. THE THEORY OF KNOWLEDGE. Criteria of existence and of proof. Types of method and of generalization. Prerequisite: six hours in philosophy. Not given in 1931-1932. Second semester (3).

Phil. 111. THE THEORY OF EDUCATION. The concepts of educational aim and method. The opinions which now prevail in this field are critically examined, in the light of their origin and their underlying assumptions. Prerequisite: six hours in philosophy. Not given in 1931-1932. First semester (3).

Phil. 112. THE THEORY OF HUMAN RELATIONS. The psychology of socialization and the philosophy of political justice. Current assumptions are compared with the principles adopted by great philosophical systems in their relation to this field of inquiry. Prerequisite: six hours in philosophy. Not given in 1932-1933. Second semester (3).

For Graduates

Prerequisite to major graduate work in Philosophy: four undergraduate courses in the subjects of the department, including nine semester hours in philosophy, or equivalent preparation.

Phil. 201. HISTORY OF PHILOSOPHY: ANCIENT AND MEDIAEVAL. Rise of the Hellenic schools of philosophy, the effect of Greek philosophy upon Christian doctrine; Scholasticism and the Schoolmen. Alternating with Phil. 205. First semester (3). Professor Hughes.

Phil. 202. HISTORY OF PHILOSOPHY: MODERN. The emphasis is placed upon Hobbes, Spinoza, Leibnitz, and Locke; upon Kant and Hegel; and upon Bergson and James. Alternating with Phil. 206. Second semester (3). Assistant Professor Becker.

Phil. 205. PLATO. Discussion will deal chiefly with contrast between the dialectic and the poetic phases of Plato's thought. Prerequisites: Phil. 1, and 2, 3, or 14. Alternating with Phil. 201. First semester (3). Professor Hughes.

Phil. 206. SPINOZA. The *Emendation* and the *Ethics*. Discussion will largely relate to current "philosophies of science." Prerequisites: Phil. 1, and 2, 3, or 14. Alternating with Phil. 202. Second semester (3). Assistant Professor Becker.

Phil. 208. THESIS IN PHILOSOPHY. First semester (2) or (3). Professor Hughes, Assistant Professor Becker.

Phil. 209. THESIS IN PHILOSOPHY. Second semester (2) or (3). Professor Hughes, Assistant Professor Becker.

PSYCHOLOGY

Psych. 1. GENERAL PSYCHOLOGY. The life-movement and life-career of persons, and the laws found to prevail therein. The processes, conditions, and patterns that characterize personal life. Methods of appraising capacity and achievements. The scope and task of psychology. First semester (3).

Psych. 2. EDUCATIONAL PSYCHOLOGY. The educative process; analysis of mental traits; learning and teaching. Prerequisite: Psych. 1. First semester (3).

Psych. 4. SOCIAL PSYCHOLOGY. The characteristics of human nature that are exhibited in group life. Principles that may be applied by society to the modification of individuals. Each semester (3).

Psych. 5. INTRODUCTION TO PSYCHOLOGY. A course specially designed for those who have not decided to take any later courses in psychology. Each semester (3).

Psych. 6. ABNORMAL PSYCHOLOGY. Primarily for seniors in the premedical curriculum. Mental disorders and mental hygiene: the psychology of the emotions and of temperament. Reading, discussions, and a series of clinics at the State Hospital. Prerequisite: Psych. 1, or 5 or 10. Second semester (3).

Psych. 10. PRINCIPLES OF PSYCHOLOGY. A course similar to Psych. 1, but scheduled and modified to meet the needs of students in Business Administration. First semester (3).

Psych. 11. LABORATORY AND STATISTICAL PSYCHOLOGY. An introduction to laboratory method. Prerequisite: six hours in psychology. First semester (3).

Psych. 12. LABORATORY AND STATISTICAL PSYCHOLOGY. Similar to Psych. 11, but permitting to qualified students the selection of some specific problem. Second semester (3).

Psych. 15. PSYCHOLOGY APPLIED TO BUSINESS AND INDUSTRY. Work and fatigue; motivation; problems of personnel and of training; psychological factors in display and persuasion; factors that reduce efficiency. Prerequisite: Psych. 1, or 5 or 10. Second semester (3).

Psych. 16. PSYCHOLOGY APPLIED TO BUSINESS AND INDUSTRY. A course similar to Psych. 15, but offered especially for students in engineering who have had Psych. 5. Each semester (3).

Psych. 19. THE PSYCHOLOGY OF CONDUCT. A study of motivation and choice. Each semester (1).

Psych. 20. THE PSYCHOLOGY OF CONDUCT. Similar to Psych. 19, which is prerequisite. Second semester (1).

READING AND INVESTIGATION IN PSYCHOLOGY. Qualified students may pursue a course of reading in psychology, which will include the investigation of some problem, either through experiment or otherwise. Professor Hughes, Assistant Professor Graham.

For Advanced Undergraduates and Graduates

Psych. 103. EDUCATIONAL PSYCHOLOGY, ADVANCED. Practice in administering individual and group tests: study of administrative applications and of classical investigations, with some first-hand investigation or experiment. Prerequisite: Psych. 2 or 4 or 15. First or second semester (3).

Psych. 113. CLINICAL PSYCHOLOGY. A study of exceptional children and of psychopathological symptoms and personalities. Practice in the use of mental tests of many kinds. Prerequisite: six hours in psychology. First or second semester (2) or (3).

For Graduates

Evidence of the satisfactory completion of at least four undergraduate courses in Psychology will be demanded of students who wish to do their major graduate work in psychology.

Psych. 202. PSYCHOLOGICAL TESTS AND MEASUREMENTS. The theory of these tests is studied historically, and also in the effort to formulate and work out new tests. In addition the personnel problem presented by a specific situation, either in a school or in a business firm, is made a matter of detailed investigation. Second semester (2) or (3). Assistant Professor Graham.

Psych. 203. SEMINAR AND THESIS IN PSYCHOLOGY. First semester (2) or (3). Professor Hughes, Assistant Professor Graham.

Psych. 204. SEMINAR AND THESIS IN PSYCHOLOGY. Second semester (2) or (3). Professor Hughes, Assistant Professor Graham.

Psych. 209. SYSTEMATIC PSYCHOLOGY. The several methods and programs of current psychology in their relation to each other and to the essential purposes of the science. An historical and theoretical study. First semester (3). Professor Hughes.

Psych. 210. SYSTEMATIC PSYCHOLOGY. Continuation of Psych. 209. Second semester (3). Professor Hughes.

EDUCATION

See also statement concerning preparation for teaching, in description of the College of Arts and Science.

Educ. 1. INTRODUCTION TO TEACHING. Adjusting pupils' school and social interests; introduction of pupil to effective methods of study; subject matter and method relating to technique and routine. First semester (3).

Educ. 2. HISTORY OF EDUCATION. The advance of civilization and culture and the parallel progress of educational theory and practice. (1) Evolution of subject matter; (2) evolution of educational institutions; (3) educational leaders. Second semester (3).

Educ. 7. PRINCIPLES OF HIGH SCHOOL TEACHING. Character and qualifications essential to the high school teacher; the character of the high school student; types of class exercises; essential factors and devices: lesson-planning and assignment; the library and source material; problems and projects; exercises in lesson planning, readings, and observations. First semester (3).

Educ. 8. THE POLITICAL ASPECT OF SCHOOL SYSTEMS. State and local school systems; political and administrative principles which guide state control of educational agencies. Prerequisite: Educ. 2 or 7. Second semester (3).

Educ. 10. SUPERVISION OF TEACHING AND SCHOOL MANAGEMENT. Organization and routine of school and classroom; management, discipline, supplies, forms, reports, marking, grading, testing, promotion, the external aspects of teaching. Prerequisite: Educ. 7. Second semester (3).

Educ. 15. PRACTICE TEACHING. This work is for the most part carried on in the Bethlehem High School. (1) Observation and report with conference; (2) participation in the routine work of the class, conduct of study periods, and correcting papers; (3) actual conduct of class, careful study of lesson plans, followed by systematic criticism by the assisting teacher and by the professors of the department. Prerequisite: a course in Education. First semester (3).

Educ. 16. PRACTICE TEACHING. Continuation of Educ. 15. Second semester (3).

For courses in special methods see Lat. 10 and 109. Ger. 21, Fr. 95 and 96, P.E. 22, 23, and 24, Phys. 31; for educational psychology, see Psych. 2 and 103; for the philosophy of education, see Phil. 111.

For Advanced Undergraduates and Graduates

Educ. 109. PRINCIPLES OF EDUCATION. The theory of education based upon socially determined aims and values, upon biological and psychological factors in the pupil, and upon institutional processes. Summer session (3).

Educ. 111. PROBLEMS OF SECONDARY EDUCATION. The social background of American secondary education; aims, values, and functions; analysis of each of the secondary subjects. Problems arising out of adolescence; out of individual differences; out of economic and social conditions; programs of studies; administrative problems; extra-curricular activities; the teaching staff; the plant and its equipment; cost and finance. Prerequisites: Educ. 1, and 7 or 10. First semester (3).

Educ. 114. CONTEMPORANEOUS EDUCATION. Readings in current educational literature which explain and indicate trends in the philosophy and practice of education. Second semester (3).

For Graduates

At least four semester courses in education are prerequisite for a graduate major in this field. The prerequisites may be taken concurrently with a partial major program. Attention is called to Educ. 109, 111, and 114, to Psych. 103, 113, and 202, and to Phil. 111, all of which are open to seniors and graduate students, and which may be accepted towards a major or minor in Education.

Educ. 201. SCHOOL ADMINISTRATION. State and local systems. How the state organizes its department of education, sets up professional standards and initiates educational programs; how it delegates power in education to subordinate units, and controls county and city districts; how it controls other educational institutions; the home and industry as they supplement education or compete with it. Alternating with Educ. 203. First semester (2). Assistant Professor Drown.

Educ. 202. SCHOOL ADMINISTRATION. City school systems. The school district and the municipality; organization, function, and personnel of the school board and the administrative and teaching staffs; financial problems of the system; the organization of the teaching program, secondary education, elementary education, vocational and special education, programs and courses of study; supervision, general and special. Alternating with Educ. 204. Second semester (2). Assistant Professor Drown.

Educ. 203. SECONDARY EDUCATION. Renaissance and Reformation influences in secondary education; characteristic types of secondary schools in the United States; problems of adolescence and the secondary schools; secondary school aims and the American social structure. Alternating with Educ. 201. First semester (2). Assistant Professor Drown.

Educ. 204. SECONDARY EDUCATION. Continuation of Educ. 203. Secondary school subjects analyzed for their educational values; curriculum problems; administrative problems. Alternating with Educ. 202. Second semester (2). Assistant Professor Drown.

Educ. 205. JUNIOR HIGH SCHOOL. Articulation of secondary and elementary schools; administrative reforms, curriculum reforms. Summer session (3). Assistant Professor Drown.

Educ. 211. HISTORY OF EDUCATION, ADVANCED COURSE. The comparison of past practice and theory with present tendencies is the essential theme or method of this course. Summer session (3). Assistant Professor Drown.

Educ. 213. EDUCATIONAL SYSTEMS IN AMERICA AND EUROPE. A course that relates educational organization to the political and social background. First semester (3). Assistant Professor Drown.

Educ. 215. SEMINAR AND THESIS IN EDUCATION. Organization of individual studies and investigation about some central topic. First semester (2) or (3). Professor Hughes, Assistant Professor Drown.

Educ. 216. SEMINAR AND THESIS IN EDUCATION. Conducted similarly to Educ. 215. Second semester (2) or (3). Professor Hughes, Assistant Professor Drown.

PHYSICAL EDUCATION

PROFESSOR REITER, ASSISTANT PROFESSOR BARTLETT,
MESSRS. KANALY AND MAHONEY

The aim of the Department of Physical Education is to insure the health and physical development of every student of the University. Facilities for accomplishing this aim are afforded in Taylor Gymnasium, the field house, the two playing levels of Taylor Field, and Lehigh Field.

Each student, upon entering the University, is given a physical examination by the Director of the Students' Health Service, assisted by the Department of Physical Education. He is advised as to postural and physical defects.

All students are required to take regular exercise under department supervision. This requirement calls for two hours a week in the gymnasium, or participation, under the oversight of the director, in one of the following organized sports: football, cross country running, basketball, wrestling, swimming, soccer, track, lacrosse, tennis, and baseball. All students are urged and encouraged to participate in these activities. Members of the R.O.T.C. unit may substitute one hour of military drill for one of the two hours of required gymnasium.

Individual exercise is held for the correction of physical and functional defects. This group of students is carefully examined preliminary to taking up the work and guarded during each period.

A large number of activities are offered to the student to choose from, keeping in mind that the well trained man is one who has skill, strength, and speed. A student is encouraged to change his activity whenever it is thought best for the all round development of his personality. Opportunity is offered in the following activities: mass exercises, mass swimming, beginners' swimming, boxing, fencing, apparatus stunts, handball, life saving, athletic dancing, wrestling, and track. All undergraduate students must swim seventy-five feet before graduation.

In recent years there has been an ever growing demand that the general student body shall reap the benefits of organized sports. This demand is constantly being met by the department in the form of organized activities in all branches. These

interests have extended to dormitory, fraternity, interclass, and independent groups. One of the objectives of the department is to interest the student in that form of activity which will provide him with an interest throughout his after life.

Intercollegiate Sports. The coaches cooperate with the Department in the supervision of various intercollegiate freshman and varsity sports. All records of attendance are kept by the Department of Physical Education.

Injuries. Any student who receives a personal injury while engaged in any sport must report the injury as soon as possible to the Professor of Physical Education. The University maintains a well equipped Health Service where medical treatment may be secured.

- P.E. 1. PHYSICAL EDUCATION. Freshman first semester.
- P.E. 2. PHYSICAL EDUCATION. Freshman second semester.
- P.E. 3. PHYSICAL EDUCATION. Sophomore first semester.
- P.E. 4. PHYSICAL EDUCATION. Sophomore second semester.
- P.E. 5. PHYSICAL EDUCATION. Junior first semester.
- P.E. 6. PHYSICAL EDUCATION. Junior second semester.
- P.E. 7. PHYSICAL EDUCATION. Senior first semester.
- P.E. 8. PHYSICAL EDUCATION. Senior second semester.

For Juniors and Seniors

The following courses are open only to juniors and seniors preparing themselves for professional careers in teaching and athletic coaching.

P.E. 22. THEORY AND PRACTICE OF FOOTBALL. (1) Preliminaries: equipment, conditioning, passing in its various forms, blocking, tackling, following and falling on the ball, punting, drop-kicking, place and goal kicking, methods of warding off and eluding the tacklers. (2) Offense: the advantages and disadvantages of the "huddle system" vs. the old system of signals. The various systems of plays among the colleges. (3) Defense: the various systems in use and their application in the different zones of the field. The strategy of meeting open, closed, and kick formations. Defense for forward passes, kicks, etc. Team play, field tactics, coaching systems, individual positions, the coach and his personality, and the de-

velopment of personality in players. The place of scouting, planning the practice periods, play work, and fatigue. Special stress upon sportsmanship, ethical and educational factors relating to the game; considerable time spent on first aid and treatment of injuries, training, and personal hygiene. Throughout the course the discussion and interpretation of the rules. Text books and discussion. Three exercises in class room, one hour practical demonstration. Second semester (3).

P.E. 23. THE ORGANIZATION AND ADMINISTRATION OF PHYSICAL EDUCATION: THEORY. A course dealing with the problems of the organization and supervision of physical education programs. This course includes the history of physical education systems, the administration of intramural activities, the qualifications of physical educators, the methods of teaching, and the planning of programs. Text-book is Williams' *Principles of Physical Education*. Outside readings, reports, and surveys required. Second semester (2).

P.E. 24. THE ORGANIZATION AND ADMINISTRATION OF PHYSICAL EDUCATION: PRACTICE. The practice of teaching mass physical activities, including athletics, combative events, gymnastic games, apparatus stunts, and efficiency tests. Programs of corrective exercise for postural defects will be considered. The student is given an opportunity to do creative work in the field of physical education. Three hours practice a week. Second semester (1).

PHYSICS

PROFESSOR BIDWELL,

ASSOCIATE PROFESSORS BAYLEY AND PETERSEN,

ASSISTANT PROFESSORS CARWILE, BERGER, FREY, AND C. R. LARKIN,

MESSRS. F. A. SCOTT, HENSHAW, HOLMES, OSTEN, M. EWING,

BINKLEY, MOWRER, SHUGART, AND MYER

Phys. 1. ELEMENTARY PHYSICS. Lecture demonstrations and conferences. First or second semester (4).

Phys. 4. MECHANICS, LIGHT, AND SOUND. Recitations. Prerequisites: Phys. 1, Math. 4. Second semester (3).

Phys. 5. PHYSICS LABORATORY. Mechanics, light, and sound. Prerequisites: Phys. 1, Math. 4. (Should be taken simultaneously with Phys. 4.) Fee, \$6.00. Second semester (1).

Phys. 6. ELECTRICITY, MAGNETISM, AND HEAT. Recitations. Prerequisites: Phys. 1, Math. 4. (Math. 4 may be taken simultaneously with Phys. 6.) First semester (3).

Phys. 7. PHYSICS LABORATORY. Electricity, magnetism, and heat. Prerequisites: Phys. 1, Math. 4. (Should be taken simultaneously with Phys. 6.) Fee, \$6.00. First semester (1).

Phys. 10. ELECTRICAL LABORATORY. Precise measurements. Prerequisites: Phys. 1, 6, and 7. Fee, \$6.00. First semester (1).

Phys. 11. ELECTRICAL LABORATORY. Precise measurements. Continuation of Phys. 10. Prerequisite: Phys. 10. Fee, \$6.00. Second semester (1).

Phys. 12. INTRODUCTION TO PHYSICS. A survey course for students in the Colleges of Arts and Science and of Business Administration. A brief introduction to the principal fields of physics. Lecture demonstrations, recitations, and laboratory. Fee, \$6.00. First semester (3).

Phys. 13. GENERAL PHYSICS. A dovetailed expansion of the first half of Phys. 12, without repetition. Lecture demonstrations, recitations, and laboratory. Prerequisites: Phys. 12 and Math. 1 or 1a or equivalent. Fee, \$6.00. Second semester (3).

Phys. 14. GENERAL PHYSICS. A dovetailed expansion of the second half of Phys. 12, without repetition. Lecture demonstrations, recitations, and laboratory. Prerequisite: Phys. 13. Fee, \$6.00. First semester (3).

Phys. 15. MODERN PHYSICS. A non-mathematical introduction to contemporary phenomena and theories in physics. Lecture demonstrations, recitations, and laboratory. Prerequisite: Phys. 14. Fee, \$6.00. Second semester (3).

Phys. 13, 14, and 15 are offered for those who desire a further study of physics as an elective, for pre-medical students, and for those who wish to begin a major in physics. Phys. 13 and 14 are designed as one complete course, a fuller and more thorough treatment of the general phenomena of physics than Phys. 12.

Phys. 31. TEACHING OF PHYSICS IN SECONDARY SCHOOLS. Principles of scientific methods, study of class room practices

in neighboring schools, text-books, and methods. First semester (2).

Phys. 50. Following the junior year, students in the curriculum in Engineering Physics are required to spend at least eight weeks in industrial employment and to present a written report.

For Advanced Undergraduates and Graduates

Phys. 120. ELECTRIC OSCILLATIONS AND ELECTRIC WAVES. A course dealing with electric oscillations and waves and high frequency phenomena. Prerequisites: Math. 4, Phys. 6 or 14. One laboratory and two class periods per week. Fee, \$6.00. First semester (3).

Phys. 122. PHYSICAL OPTICS AND SPECTROSCOPY. A course dealing with the wave theory of light, interference, diffraction, polarization, etc.; exposition of some phases of spectroscopic phenomena. Prerequisites: Math. 4, Phys. 4 and 6, or 14. One laboratory and two class periods per week. Fee, \$6.00. First semester (3).

Phys. 124. ELECTRICAL DISCHARGE THROUGH GASES. A course covering properties of gaseous ions, the experimental data leading to the electron theory, including a study of vacuum tube phenomena, ionization and resonance potential, photoelectricity, etc. Prerequisites: Math. 4, Phys. 6 or 14. One laboratory and two class periods per week. Fee, \$6.00. Second semester (3).

Phys. 126. HEAT. A course dealing with thermometry, heat transfer, pyrometry, kinetic theory, and an introduction to thermodynamics. Prerequisites: Math. 4, Phys. 4 and 6, or 14. One laboratory and two class periods per week. Fee, \$6.00. Second semester (3).

Phys. 127. INTERMEDIATE LABORATORY. Laboratory work on special topics. Prerequisites: Phys. 5 and 7 or their equivalent. Fee, \$6.00. First semester (1).

Phys. 128. INTERMEDIATE LABORATORY. Laboratory work on special topics. Prerequisites: Phys. 6 and 7 or their equivalent. Fee, \$6.00. Second semester (1).

Phys. 160. INTRODUCTION TO MODERN PHYSICAL THEORIES. A lecture course on recent developments, including Maxwell's field equations, photo-electricity, radiation, the quantum theory, and the structure of the atom. Prerequisites: Phys. 6 or 14 or their equivalent, Math. 4. First semester (3).

Phys. 161. INTRODUCTION TO MODERN PHYSICAL THEORIES. Continuation of Phys. 160. Prerequisite: Phys. 160. Second semester (3).

Phys. 162. INTRODUCTORY THEORY OF ELECTRICITY AND MAGNETISM. Magnetic fields and potentials; electrostatic fields, potentials and capacities; the Maxwell-Thomson theory of lines of force; electromagnetic fields; variable and alternating currents. Prerequisites: Phys. 6, Math. 4. First semester (3).

Phys. 163. INTRODUCTORY THEORY OF ELECTRICITY AND MAGNETISM. Continuation of Phys. 162. Prerequisite: Phys. 162. Second semester (3).

Phys. 164. ADVANCED LABORATORY. Laboratory work of research type. Special problems assigned and the student placed very much on his own initiative. Prerequisite: senior standing. Fee, \$6.00. First semester (1) or (2).

Phys. 165. ADVANCED LABORATORY. Continuation of Phys. 164. Prerequisite: senior standing. Fee, \$6.00. Second semester (1) or (2).

For Graduates

Math. 219 and 220, Selected Topics in Quantum Mechanics and Relativity, may be included in a graduate major in Physics.

Phys. 200. INTRODUCTION TO MATHEMATICAL PHYSICS. The application of mathematical analysis to physics. The subjects treated include attraction, hydrodynamics, heat conduction, wave motion, electromagnetic theory and thermodynamics. Prerequisites: Math. 6, Phys. 6 or their equivalent. Not given in 1931-1932. First semester (3). Assistant Professor Larkin.

Phys. 201. KINETIC THEORY. The classical considerations of the kinetic theory of gases substantially as in Jäger with some

additional applications to electrical phenomena. Prerequisites: Math. 6, Phys. 126 or their equivalent. Not given in 1931-1932. First semester (3). Associate Professor Petersen.

Phys. 202. THERMODYNAMICS. A course devoted principally to classical thermodynamics following Planck. Prerequisites: Math. 6, Phys. 126 or their equivalent. Not given in 1931-1932. Second semester (3). Associate Professor Petersen.

Phys. 203. THEORY OF ELECTRICITY. Electrostatics, electrodynamics, and electromagnetic theory treated principally from the classical viewpoint. Prerequisites: Phys. 162, 163, Math. 6 or their equivalent. Not given in 1931-1932. Second semester (3). Assistant Professor Carwile.

Phys. 206. WAVE MOTION AND SOUND. The kinematics and dynamics of wave motion, the theory of vibrating systems, the production, propagation, and detection of sound. Prerequisites: Math. 6, Phys. 4 or their equivalent. Not given in 1930-1931. First semester (3). Assistant Professor Larkin.

Phys. 207. THEORY OF LIGHT. The propagation of light, interference, diffraction; the measurement of wave-length, crystal optics; introduction of quantum theories of the interpretation of spectra. This course follows Shuster and Nicholson's *Theory of Optics*; Prerequisites: Math. 6, Phys. 122 or their equivalent. Not given in 1930-1931. First semester (3). Associate Professor Petersen.

Phys. 208. THEORY OF LIGHT. Continuation of Phys. 207. Prerequisite: Phys. 207. Not given in 1930-1931. Second semester (3). Associate Professor Petersen.

Phys. 209. ADVANCED DYNAMICS. Principles of statics and dynamics; Lagrange's equations with application to particles and rigid bodies, and the theory of oscillations. Prerequisites: Math. 6, Phys. 4 or their equivalent. Not given in 1930-1931. Second semester (3). Assistant Professor Larkin.

Phys. 211. PHYSICS SEMINAR. Reports on current literature and research in progress. First semester (1). Professor Bidwell.

Phys. 212. PHYSICS SEMINAR. Continuation of Phys. 211. Second semester (1). Professor Bidwell.

PSYCHOLOGY

See Philosophy, Psychology, and Education

ROMANCE LANGUAGES

PROFESSOR FOX. ASSOCIATE PROFESSOR TOOHY,
ASSISTANT PROFESSORS H. C. BROWN AND SOTO,
MESSRS. D. G. SCOTT, FARNÉ, AND CARTER

FRENCH

Fr. 1. **ELEMENTARY FRENCH.** First semester (3).

Fr. 2. **ELEMENTARY FRENCH.** Continuation of Fr. 1. Prerequisite: Fr. 1 or the equivalent. Second semester (3).

Fr. 11. **INTERMEDIATE FRENCH.** Prose and poetry. Balzac, Flaubert, Daudet, Moliere, Corneille, Racine. Society in the seventeenth century. Drill in speaking and writing. Primarily for students in Arts and Science and Business Administration who have had two years of entrance French. First semester (3).

Fr. 12. **INTERMEDIATE FRENCH.** Continuation of Fr. 11. Second semester (3).

Fr. 21. **FRENCH CLASSICS.** Based on the reading of a number of texts selected mainly from seventeenth and eighteenth centuries. While the main emphasis is placed on correct translation, an accurate knowledge of grammatical construction, idiomatic locutions, and the acquisition of volume in the matter of vocabulary, literary values are also considered and outside reading is assigned on relevant chapters in some history of French literature. Prerequisite Fr. 11. First semester (3).

Fr. 22. **FRENCH LITERATURE IN THE SEVENTEENTH AND EIGHTEENTH CENTURIES.** Continuation of Fr. 21. Prerequisite: Fr. 11. Second semester (3).

Fr. 31. **FRENCH LITERATURE IN THE NINETEENTH CENTURY.** Prerequisite: Fr. 21. First semester (3).

Fr. 32. **FRENCH LITERATURE IN THE NINETEENTH CENTURY.** Prerequisite: Fr. 21. Second semester (3).

Fr. 33. CONTEMPORARY FRENCH LITERATURE. Prerequisite: Fr. 21. First semester (3).

Fr. 34. CONTEMPORARY FRENCH LITERATURE. Continuation of Fr. 33. Prerequisite: Fr. 21. Second semester (3).

Fr. 93. FRENCH ORAL COMPOSITION. TEXTS AND METHODS. A course for students who wish a greater opportunity to practice in the oral and written use of modern French prose. Specially recommended for those who expect to teach French. Prerequisite: permission of instructor in charge of the course. First semester (3).

Fr. 94. FRENCH ORAL COMPOSITION. TEXTS AND METHODS. Continuation of Fr. 93. Second semester (3).

For Advanced Undergraduates and Graduates

Fr. 141. FRENCH LITERARY HISTORY. General review of French literature. Reading, lectures, and explanation of texts. Prerequisite: Fr. 21. First semester (3).

Fr. 142. FRENCH LITERARY HISTORY. Continuation of Fr. 141. Prerequisite: Fr. 21. Second semester (3).

Fr. 145. SEMINAR. A study of the works of some author or group of authors or of a period. Prerequisite: Fr. 21. First semester (3).

Fr. 146. SEMINAR. Continuation of Fr. 145. Prerequisite: Fr. 21. Second semester (3).

Fr. 151. FRENCH LITERATURE IN THE SIXTEENTH CENTURY AND EARLIER. Prose and poetry. Rebelais, Montaigne, Marot, Villon, Froissart, Commynes. Prerequisite: Fr. 21. First semester (3).

Fr. 152. FRENCH LITERATURE IN THE SIXTEENTH CENTURY AND EARLIER. Continuation of Fr. 151. Prerequisite: Fr. 21. Second semester (3).

For Graduates

Prerequisites: Graduate students who major in French must have completed not less than twelve semester hours of French language and literature above the standard intermediate courses. A reading knowledge of Latin and German is desirable; a general knowledge of English literature is required.

Fr. 201. OLD FRENCH. Grammar, Schwan-Behrens. Earlier texts. *Chanson de Roland*. Given in 1931-1932. First semester (3). Associate Professor Toohy.

Fr. 202. OLD FRENCH. Continuation of Fr. 201. Second semester (3). Associate Professor Toohy.

Fr. 251. THE HISTORY OF THE NOVEL IN FRANCE. This course traces the growth of the novel as a form of literature and its various transformations. A number of the representative masterpieces of different periods are read, and both their technical qualities and their relation to the social and intellectual environments are studied. Particular attention is given to the preparation and development of realism in the nineteenth century. Given in 1931-1932. First semester (3). Assistant Professor Brown.

Fr. 252. THE HISTORY OF THE REALISTIC NOVEL IN FRANCE. Continuation of Fr. 251. Second semester (3). Assistant Professor Brown.

Fr. 255. FRENCH SOCIAL FORCES. As exemplified in modern French literature. Given in 1931-1932. First semester (3). Mr. Scott.

Fr. 256. FRENCH SOCIAL FORCES. Continuation of Fr. 255. Second semester (3). Mr. Scott.

SPANISH

Span. 1. ELEMENTARY SPANISH. First semester (3).

Span. 2. ELEMENTARY SPANISH. Continuation of Span. 1. Prerequisite: Span. 1 or the equivalent. Second semester (3).

Span. 11. INTERMEDIATE SPANISH. Continuation of Span. 2. Prerequisites: Span. 1 and 2. First semester (3).

Span. 12. INTERMEDIATE SPANISH. Continuation of Span. 11. Second semester (3).

Span. 21. SPANISH NOVELS AND PLAYS. Continuation of Span. 12. Prerequisite: Span. 11. First semester (3).

Span. 22. SPANISH NOVELS AND PLAYS. Continuation of Span. 21. Prerequisite: Span. 11. Second semester (3).

Span. 93. SPANISH ORAL COMPOSITION. A course for students who wish a greater opportunity to practice in the oral and written use of Spanish prose. Specially recommended for those who expect to teach Spanish. Prerequisite: permission of instructor in charge of course. First semester (3).

Span. 94. SPANISH ORAL COMPOSITION. Continuation of Span. 93. Second semester (3).

For Advanced Undergraduates and Graduates

Span. 135. SPANISH AMERICAN LITERATURE. Social and historic forces in Spain and the Spanish American republics as exemplified in the modern literature of those countries. Prerequisite: Span. 21. First semester (3).

Span. 136. SPANISH AMERICAN LITERATURE. Continuation of Span. 135. Prerequisite: Span. 21. Second semester (3).

Span. 141. SPANISH FICTION OF THE SIXTEENTH AND SEVENTEENTH CENTURIES. Study of the novel in the Golden Age of Spanish literature, especially of Cervantes' *Don Quixote*. Collateral reading in modern Spanish prose dealing with the subject of the course, and reports. Prerequisite: Span. 21. First semester (3).

Span. 142. SPANISH DRAMA OF THE SIXTEENTH AND SEVENTEENTH CENTURIES. Plays of Lope de Vega, Tirso de Molina, and Calderón. Collateral reading in modern Spanish prose dealing with the subject of the course, and reports. Prerequisite: Span. 21. Second semester (3).

Span. 143. SEMINAR. A study of the works of some author or group of authors or of a period. Prerequisite: Span. 21. First semester (3).

Span. 144. SEMINAR. Continuation of Span. 143. Prerequisite: Span. 21. Second semester (3).

For Graduates

Prerequisites: Graduate students who major in Spanish must have completed not less than twelve semester hours of Spanish language and literature above the standard intermediate courses. A reading knowledge of Latin and French is desirable.

Span. 201. OLD SPANISH. Ford's *Old Spanish Readings*. Given in 1931-1932. First semester (3). Assistant Professor Soto.

Span. 202. OLD SPANISH. Continuation of Span. 201. Second semester (3). Assistant Professor Soto.

Span. 251. THE MODERN SPANISH NOVEL. Works of Galdós, Alarcón, Valera, Pereda, Valdés, Pardo Bazan, Blasco Ibáñez, Valle Inclán, Baroja. Reading, reports, and lectures. Given in 1932-1933. First semester (3). Assistant Professor Soto.

Span. 252. THE MODERN SPANISH NOVEL. Continuation of Span. 251. Second semester (3). Assistant Professor Soto.

ITALIAN

Ital. 1. ELEMENTARY ITALIAN. Grammar and composition; rapid reading of easy modern prose. First semester (3).

Ital. 2. ELEMENTARY ITALIAN. Continuation of Ital. 1. Second semester (3).

Ital. 11. INTERMEDIATE ITALIAN. Masterpieces of classic periods. Outside reading. Prerequisites: Ital. 1 and 2. First semester (3).

Ital. 12. INTERMEDIATE ITALIAN. Continuation of Ital. 11. Second semester (3).

SPANISH

See Romance Languages

CHAPEL

As a prerequisite to graduation it is required that students elect either chapel attendance for two years or Present-day Ethical Problems, Philosophy of Religion, Psychology of Conduct, or the Bible as Literature for one year. The requirement may be satisfied by any one of the following methods: (1) by attendance at the regular chapel exercises on an average of at least three times a week (out of the possible total of five such exercises given each week) for two years; (2) by the satisfactory completion of the courses in Philosophy of Religion: Phil. 5 and Phil. 6; (3) by the satisfactory completion of the courses in Present-day Ethical Problems: Phil. 11 and Phil. 12; (4) by the satisfactory completion of the courses in Psychology of Conduct: Psych. 20 and Psych. 21; (5) by the

satisfactory completion of the courses in the Bible as Literature: Eng. 33 and Eng. 34. Chapel exercises, consisting of brief addresses, reading from religious literature, and selections from classical music, are held daily from Monday to Friday inclusive, from 7:45 to 8:00 A.M.

THE LEHIGH UNIVERSITY BAND

Band may be elected by suitably qualified freshmen and sophomores in lieu of Military Science and Tactics. It is an optional subject for suitably qualified juniors and seniors. The band is drilled according to the methods prescribed for regular army bands by one of the sergeants designated for that purpose by the Head of the Department of Military Science and Tactics.

The band is required to participate in military ceremonies when called upon by the Professor of Military Science and Tactics, and also to attend all football games played at home and not more than ten other home games, to be specified by the Graduate Manager of Athletics. When it appears for military ceremonies the band is to be considered an integral part of the R. O. T. C. regiment.

Coat and cap of uniform, musical instruments, and music are furnished by the University. Members of the band furnish white flannel trousers. A deposit of \$25.00 is required from each member of the band for an instrument or uniform.

Seniors and juniors who qualify for membership in the band may substitute band work for the requirement in Physical Education; sophomores and freshmen may substitute band work for the requirements in Physical Education and in Military Science and Tactics. Credit is not given during any semester for both band and either of the above named subjects. Students desiring to play in the band as volunteers may do so, if qualified, and are entitled to the awards named in the following paragraph:

In addition to the above credits, one year of satisfactory service in the band entitles a student to a watch fob; two years of service, a sweater; three years, \$20.00 in cash; and four years, an additional \$20.00 in cash. These awards are made only to those members of the band who maintain at least sixty per cent. attendance each term at rehearsals, military ceremonies, and college activities.

SUMMER SESSION

The various courses given during the summer are administered by the Director of the Summer Session and a faculty consisting of those teaching in the summer session. All courses are conducted in accordance with the same standards, and may be credited towards a degree on the same basis, as courses given in the first and second semesters. Women are admitted to the summer session either as graduate or as undergraduate students on the same terms as men. Certificates of academic credit are issued, on request, for all courses satisfactorily pursued.

The courses offered during the summer session are arranged in three distinct groups: (1) courses which are an integral part of certain engineering curricula; (2) courses in a large variety of subjects offered primarily for undergraduates who wish to secure advanced credits or to make up deficiencies; (3) professional courses designed primarily for teachers.

The following courses were offered in the summer of 1930. The Summer Session Announcement, containing full description of courses to be offered in 1931 and information concerning admission, fees, etc., will be sent to any address on request.

REQUIRED COURSES IN ENGINEERING

June 2 to June 28

Chem. 39	Assaying, Coal, Gas, and Oil Analysis.....	(4)
C.E. 6	Land and Topographic Surveying.....	(4)
M.E. 24	Engineering Laboratory	(4)

June 30 to July 12

C.E. 7	Railroad Surveying	(2)
--------	--------------------------	-----

OPTIONAL COURSES

June 30 to August 9

Astr. 1	Descriptive Astronomy	(3)
Biol. 1	Biology	(3)
Biol. 7	Elementary Biology	(3)
Bus. 1	Industrial Evolution	(3)
Bus. 2	Industrial Evolution	(3)
Bus. 3	Economics	(3)
Bus. 4	Economics	(3)
Bus. 11	Accounting	(3)

Bus. 12	Accounting	(3)
Bus. 161	Sociology	(3)
Chem. 1	Elementary Chemistry	(2)
Chem. 3	Intermediate Chemistry	(2)
Chem. 6	Advanced Chemistry	(3)
Chem. 8	Stoichiometry	(1)
Chem. 11	Chemistry Laboratory	(2)
Chem. 12	Chemistry Laboratory	(1)
Chem. 20	Qualitative Analysis	(3)
Chem. 21	Qualitative Analysis	(2)
C.E. 1	Engineering Drawing	(2)
C.E. 2	Engineering Drawing	(2)
E.E. 2	Direct Current Machinery.....	(3)
E.E. 6	Alternating Currents, Advanced.....	(3)
E.E. 50	Dynamos and Motors, General.....	(2)
E.E. 52	Alternating Currents, General.....	(2)
Engl. 1	Composition and Literature.....	(3)
Engl. 2	Composition and Literature.....	(3)
Engl. 10	Introductory Public Speaking.....	(3)
Engl. 117	Drama	(3)
Engl. 122	Contemporary Literature	(3)
Engl. 126	English Literature of the Nineteenth Century	(3)
Fr. 12	Intermediate French	(3)
Ger. 2	Elementary German	(3)
Ger. 4	Intermediate German	(3)
Govt. 51	American Government (National).....	(3)
Govt. 156	International Law	(3)
Hist. 8	English History, 1603-1775.....	(3)
Hist. 225	Pennsylvania History	(3)
Lat. 21	Ancient History	(3)
Lat. 22	Ancient History	(3)
Math. 1	Plane Trigonometry	(3)
Math. 2	Algebra	(3)
Math. 3	Analytic Geometry	(3)
Math. 4	Elementary Calculus	(3)
Math. 5	Intermediate Calculus	(3)
Math. 6	Advanced Calculus	(3)
Math. 16	Solid and Spherical Geometry and Spherical Trigonometry	(3)
Math. 20	Elementary Mechanics	(4)
Math. 21	Analytic Mechanics	(3)
M.E. 1	Elementary Machine Design.....	(3)
M.E. 2	Elementary Heat Engines.....	(3)
M.E. 4	Elementary Machine Design.....	(3)
M.E. 5	Heat Engines	(3)
Phil. 2	History of Philosophy, Modern.....	(3)
Phil. 3	Introduction to Philosophy.....	(3)
Phil. 11	Ethics	(1)
Phil. 12	Ethics	(1)
Phys. 1	Elementary Physics	(4)

Phys. 4	Mechanics, Light, and Sound.....	(3)
Phys. 5	Physics Laboratory	(1)
Phys. 6	Electricity, Magnetism, and Heat.....	(3)
Phys. 7	Physics Laboratory	(1)
Phys. 10	Electrical Laboratory	(1)
Phys. 11	Electrical Laboratory	(1)
Phys. 12	General Physics	(3)
Phys. 13	General Physics	(3)
Psych. 1	General Psychology	(3)
Psych. 2	Educational Psychology	(3)
Psych. 4	Social Psychology	(3)
Psych. 5	Introduction to Psychology.....	(3)
Psych. 6	Abnormal Psychology	(3)
Psych. 10	Principles of Psychology.....	(3)
Psych. 15	Psychology applied to Business and Industry	(3)
Psych. 113	Clinical Psychology	(3)
Span. 2	Elementary Spanish	(3)

PROFESSIONAL COURSES FOR TEACHERS

July 1 to July 10

Educ. 114	Contemporaneous Education	(3)
Educ. 207	Educational Measurements	(3)
Educ. 211	History of Education, Advanced Course.....	(3)
Educ. 215	Seminar and Thesis in Education.....	(3)
Psych. 2	Educational Psychology	(3)

LEHIGH INSTITUTE OF RESEARCH

The Lehigh Institute of Research was organized in 1924 to encourage and promote scientific research and scholarly achievement in every division of learning represented in the organization of the University, and in recognition of the need for further and more exact knowledge in science and in the applications of science to the affairs of modern life.

The purposes of the Institute of Research include (1) the training of men for research work, (2) the publication of the results of investigations, (3) the conduct of general research, (4) the conduct of cooperative research, (5) the conduct of commercial tests and advisory service.

Detailed information concerning the organization and regulations of the Institute of Research are given in a pamphlet which will be furnished on request.

BUILDINGS AND GROUNDS

The University occupies nineteen buildings and its grounds cover one hundred eighty acres on the north side of South Mountain, overlooking the valley of the Lehigh River and the city of Bethlehem.

PACKER HALL

Packer Hall is a four-story sandstone building, 215 feet long and 60 feet wide.

The Department of Civil Engineering occupies the greater part of the first and second floors. The instrument rooms contain transits, levels, a large geodetic theodolite, plane tables, and other instruments for engineering field work. In the department headquarters is a collection of plans of engineering structures.

The Department of Mathematics and Astronomy and the Department of Philosophy, Psychology, and Education are located in this building. The psychology laboratory has the standard equipment for the several courses in experimental psychology and for special research.

THE WILLIAM H. CHANDLER CHEMISTRY LABORATORY

The Chemistry Laboratory is a fire-proof sandstone building, 259 feet long and 44 feet wide, with a wing 62 feet long and 42 feet wide, and with a three-story extension 60 feet long and 37 feet wide.

Laboratory space and equipment are provided for qualitative and quantitative analysis, inorganic chemistry, organic chemistry, sanitary chemistry, industrial biochemistry, colloid chemistry, X-ray analysis, gas analysis, the furnace assay of ores, industrial chemistry, and research in chemistry and chemical engineering. A chemistry museum is located in this building.

The Trustees of the University named this building the William H. Chandler Chemistry Laboratory in recognition of Dr. Chandler's thirty-five years' service as Professor of Chemistry, 1871-1906.

THE PHYSICS LABORATORY

The Physics Laboratory is a four-story sandstone building, 240 feet long and 44 to 56 feet wide. This building is

devoted entirely to the Department of Physics. Apparatus and other facilities are provided for lecture and laboratory instruction and research. In addition to offices, recitation rooms, and lecture rooms there are several large laboratory rooms, a reading room, machine shop, wood working shop, glass-blowing room, constant-temperature rooms, storage battery room, sound-proof rooms, dark rooms, and several research laboratories. The building is equipped throughout with water, gas, compressed air, and electric power outlets.

THE W. A. WILBUR ENGINEERING LABORATORY AND POWER HOUSE

The W. A. Wilbur Engineering Laboratory and Power House is a two-story sandstone building, 188 feet long and 44 feet wide.

The power plant contains three Babcock and Wilcox straight-tube cross-drum boilers, each rated at 300 boiler horse power; three Coxe chain grate stokers, two turbine driven Sturtevant blowers, and coal, water, and ash handling equipment of modern design. The plant is designed and equipped to provide steam at 250 lbs. pressure to the engineering laboratories, in addition to heating the University buildings. It is so arranged that any boiler can be isolated for laboratory tests for long periods if necessary. From this plant a six-inch line carries steam to the Packard Laboratory at the pressure desired for the laboratory work. Modern safety appliances and measuring equipment have been incorporated.

A coal-storage yard north of the building has room for a season's supply of coal, and a system of belt conveyors and bucket-elevators is provided for receiving coal, dumping it on storage pile, and conveying it into the boiler room as needed.

A floor space of 45 feet by 70 feet in the Wilbur Engineering Laboratory is used for the large equipment of the Department of Chemical Engineering.

WILLIAMS HALL

Williams Hall, the donation of Dr. Edward H. Williams, jr., of the Class of '75, was so named by the Trustees of the University not only in recognition of this gift but also of Dr. Williams' long continued and important service to the

University as an alumnus and as Professor of Mining and Geology.

Williams Hall is a three-story brick building, 186 feet long and 70 feet wide. It is devoted to the Departments of Metallurgical Engineering, Geology, and Biology.

The equipment of the Department of Metallurgical Engineering includes a heat-treating laboratory equipped with gas and electric furnaces of various types; a welding laboratory equipped with industrial welding apparatus of all the principal types, for demonstration and research purposes; and a furnace room with gas and electric furnaces for melting and casting metals, making alloys, etc. An Ajax-Northrup high-frequency induction furnace is included in this equipment.

The metallographic laboratory is provided with a Rockwell dilatometer, a Leitz, a Bausch & Lomb, and a Pellin microscope with accessory apparatus for making photomicrographs at various magnifications; also a photomicrographic projection room, and rooms for printing and developing. The preparation and testing room contains a work-bench, polishing and grinding wheels, Brinell, Rockwell, and Shore apparatus for hardness testing, and magnetic testing apparatus. The electrolytic laboratory is provided with alternating and direct current, with suitable apparatus for current and voltage control, with electroplating equipment and with sinks, hood, and all necessary apparatus for making chemical analyses incidental to metallurgical research.

The Joseph W. Richards Metallurgical Library, founded on the collection of Professor Richards, for many years head of the department, and bequeathed to the department on his death, is housed in this building.

The Department of Geology, in addition to offices, recitation rooms and lecture rooms, has a room containing the paleontological collection, a room devoted to maps and map studies, a laboratory for economic geology, a laboratory of petrology and petrography, and a department library. The lecture room contains specimens of rocks and fossils, illustrating the work in general geology, and a stereopticon. The laboratory of petrography is provided with petrographic microscopes and study collections of rocks and rock sections representing type localities from different parts of the world. The recording instru-

ments of the meteorological laboratory are electrically connected with the meteorological equipment located on the top of the Library. The Department of Geology has a mineralogical laboratory, a blowpipe analysis laboratory, a small chemical laboratory for analytical work, a room fitted with apparatus run by motors for cutting and polishing thin rock sections, mineralogical collections, a dark room, several rooms devoted to advanced work and geological research, and a store room containing supplies, surplus illustrative materials, and collections only occasionally used. The mineralogical museum contains many valuable collections and is constantly receiving additions. The foundation of the museum is the collection of Professor Theodore W. Roepper, the first professor of mineralogy in Lehigh University.

The Department of Biology has its offices, large lecture room, recitation room, working library, and laboratories in Williams Hall. A separate building, the vivarium, containing a greenhouse and animal rooms, is entered from the research laboratory of bacteriology. The student and research laboratories of this department are all thoroughly equipped with necessary modern appliances.

The building contains a lecture room, seating 208, and an examination and laboratory room, provided with drafting desks. These two rooms are for the joint use of the three departments housed in Williams Hall. The lecture room contains the museum collection of the Metallurgical Department and its diagrams and projection apparatus for lantern slides, opaque objects, and motion pictures.

THE FRITZ ENGINEERING LABORATORY

The late John Fritz, of Bethlehem, known as the father of the steel industry in the United States, a member of the original Board of Trustees of the University, gave to the University funds for the erection and thorough equipment of an engineering laboratory. The building was designed and erected under the personal supervision of Mr. Fritz. The building is equipped with a general testing section for testing iron and steel, a cement and concrete section, and a hydraulic section. The equipment is used by the Civil Engineering Department in connection with courses in Mechanics of Materials, Hydraulics, and Cement and Concrete.

The Fritz Engineering Laboratory is of modern steel frame construction, 115 feet long and 94 feet wide, with the main central section 65 feet in height, and two side sections of lesser height. An electrically-operated traveling crane, of 10-ton capacity, commands the entire central portion of the building in which the testing of large specimens is carried on.

The general testing section is equipped with an 800,000-pound Riehle vertical screw testing machine, capable of testing columns 25 feet long or less, tensile specimens 20 feet long or less, and transverse specimens up to lengths of 30 feet; an Olsen universal testing machine of 300,000 pounds capacity; smaller machines for ordinary tension, compression, transverse, and torsion tests; a cold-bend testing machine, and a small machine shop. The hydraulic section is equipped with various tanks, weirs, pumps, and other apparatus for studying problems in hydraulics. The cement and concrete section has a large room for the making and testing of specimens and a room for the storage of materials.

THE ECKLEY B. COXE MINING LABORATORY

The Eckley B. Coxe Mining Laboratory is a sandstone building, 100 feet long and 75 feet wide. It is occupied exclusively by the Department of Mining Engineering.

During the summer of 1930, the timber framing which supported much of the machinery was removed, and two new steel-concrete floors were constructed entirely within the original walls, thus practically doubling the available floor space.

The building contains the office of the professor of Mining Engineering, the main lecture room, a locker and wash room, the office of the professor of Ore Dressing and Fuel Technology, a laboratory equipped for fuel research, a balance room, a sampling laboratory and shop.

On the lower main floor are two air compressors, rock drills, a large concentrating table, a Chance coal cleaner, and a motor-generator set. The upper main floor contains a gyratory crusher, rolls, stamp mill, jigs for coal and ore, concentrating table, vanner, and centrifugal roller-mill.

The lower second floor has been equipped as a fuel technology laboratory, with chemical work tables and apparatus for

coal, gas and oil analysis, combustion, calorimetry, pyrometry, coal and oil distillation. The upper second floor is arranged for laboratory work in ore dressing and coal preparation. The equipment comprises two magnetic separators, a rod mill, a jig, three types of flotation machines, a small laboratory concentrating table, a small bowl classifier, and a suction filter. A small mine-type ventilating fan with ducts permits air current measurements. A portion of this floor is also used for Mine Surveying map work.

The laboratory was named by the Trustees of the University in memory of Eckley B. Coxe, who was a pioneer and a leader in the profession of mining engineering in this country, and an active friend and valued Trustee of the University from his early days until his death.

CHRISTMAS-SAUCON HALL

During the summer of 1926, Christmas and Saucon Halls were remodelled and joined by the addition of a four-story central building.

Christmas Hall has historic interest as the first building of Lehigh University. It was originally a church, which was purchased from the Moravian Congregation. In the earliest years of the University it contained a chapel, lecture rooms, and students' dormitory.

Christmas-Saucon Hall contains the office of the College of Business Administration, the offices, lecture rooms, and recitation rooms of the Departments of English and of Economics, Sociology, and Business Administration, and the offices and dispensary of the Students' Health Service.

COPPEE HALL

Coppée Hall is the headquarters of the College of Arts and Science. It contains the offices of the College of Arts and Science, a lecture room, and the offices and recitation rooms of the Departments of German, Latin, Greek, Romance Languages, History and Government, and Fine Arts.

SAYRE OBSERVATORY

The Sayre Observatory was the gift of the late Robert H. Sayre, one of the original Trustees of the University.

The Observatory contains an equatorial telescope by Alvin Clark, of six inches clear aperture and of eight feet focus; a modern zenith telescope of four and one-half inches clear aperture; a superior astronomical clock, by William Bond & Son; a meridian circle; a prismatic sextant, by Pistor and Martins; an engineer's transit and a sextant, by Buff and Buff. Students in practical astronomy receive instruction in the use of the instruments and in observation.

The land upon which the Observatory stands, consisting of seven acres adjoining the original grant, was presented to the University by the late Charles Brodhead, of Bethlehem.

THE PACKER MEMORIAL CHURCH

The Packer Memorial Church, in which daily chapel exercises are held, was the gift of the late Mrs. Mary Packer Cummings, daughter of the Founder of the University. It was built in 1887.

THE UNIVERSITY LIBRARY

The original Library building was erected by the Founder of the University in 1877 as a memorial to his daughter, Mrs. Lucy Packer Linderman. The present Library, constructed on three sides of the original building, is in the collegiate Gothic style of architecture. It contains five times the floor space of the old structure and affords shelving capacity for approximately 500,000 volumes. Space is provided in the reading room and seminars and other special rooms for about 500 readers. Adequate space for the cataloging departments and other purely administrative functions of the library is provided, together with special rooms for the treasure collection, the Lehigh collection, the geography collection, and the art collection. Eleven seminar rooms are provided for advanced study. The building contains a browsing room and an art gallery. Small individual cubicles are provided in the stacks for advanced students and research workers.

190,000 volumes are now upon the shelves. The list of current periodicals numbers about seven hundred. The Library is especially rich, for one of its size, in materials for research in history, American newspapers, and the history of early science, and in files of technical journals.

Small working reference collections for laboratory use are maintained by the departments of Biology, Geology, Chemical, Civil, Mechanical, and Mining Engineering.

The Library is open from 8 a.m. to 10 p.m., except on Sundays and holidays.

The use of the Library, with privilege of borrowing books, is offered to all members of the University: faculty, students, and alumni. Students are allowed free access to the books and are encouraged to become familiar with methods of using a library for literary and scientific work. The privileges of the Library are also extended to all qualified residents of the city. The Library offers its services to the industries located in the community.

The Eckley B. Coxe Memorial Collection

In memory of Eckley B. Coxe, for many years a Trustee of the University, Mrs. Coxe presented to the University his technical library, consisting of 7727 volumes and 3429 pamphlets. As the working library of a man who was remarkable for the extent and thoroughness of his acquaintance with the whole field of applied science, this collection possesses great value for scientific and engineering students.

The Joseph W. Richards Collection

The Joseph W. Richards Library of Metallurgy and Chemistry, consisting of about 3000 volumes, is located on the second floor of Williams Hall, and is open for use under the supervision of the Department of Metallurgy.

TAYLOR HALL

Taylor Hall, the gift of Mr. Andrew Carnegie, is a concrete dormitory with accommodations for 137 students. There are suites of three rooms (a study and two adjacent bedrooms), for two occupants, and a few single rooms. The building was named Taylor Hall by Mr. Carnegie in honor of Mr. Charles L. Taylor, his former partner in business, a graduate of the University in the Class of 1876, and a Trustee of the University. The rates for the suites of rooms are \$100.00 or \$120.00 a year for each occupant. The single rooms are \$50.00, \$65.00, or \$80.00 a year.

PRICE HALL

Price Hall furnishes dormitory accommodations for thirty-four students. It was named in honor of Dr. Henry R. Price, an alumnus of the University of the Class of 1870, late President of the Board of Trustees.

DROWN MEMORIAL HALL

Drown Memorial Hall was erected by friends and alumni as a memorial to the late Thomas Messinger Drown, LL.D., President of the University from 1895 to 1904. The building is devoted to the social interests of the University students. It contains study, reading, and lounging rooms, an assembly hall, and the offices of the Lehigh University Union, the Bureau of Student Employment and Housing, the Board of Control of Athletics, the college publications, and the dramatic and musical organizations. A cafeteria is located in the basement.

ALUMNI MEMORIAL BUILDING

The Alumni Memorial Building was erected as a memorial to the more than 1900 Lehigh men who served in the World War, and especially to the forty-six who gave their lives. The cost of erection was raised by subscription from about 1700 alumni. It is used as the administration building of the University. The Memorial Hall contains the records of the Lehigh men who served and those who died, together with mementos of the War.

In the south wing of the building are the offices of the President, the Dean, and the Registrar of the University. There is also a large faculty committee room in this wing. The north wing contains the offices of the Vice-President and Comptroller, the Treasurer, and the Bursar, the offices of the Alumni Association, the University Supply Bureau, also a large room used for faculty meetings, receptions, dances, the annual meeting of the Alumni Association, and meetings of the Alumni Council.

TAYLOR GYMNASIUM AND FIELD HOUSE

In 1913 Mr. Charles L. Taylor, a graduate of the University of the Class of 1876 and a member of the Board of Trustees, donated to the University the funds required for the erection of a gymnasium and a field house.

Taylor Gymnasium adjoins the athletic field. The building is 222 feet long and 73 feet wide. On the ground floor is located the game room, 93 by 70 feet, used for basketball and wrestling. The game room is surrounded by a gallery for spectators. The main gymnasium floor measures 90 by 70 feet. Other rooms in Taylor Gymnasium are the offices and measuring room of the Department of Physical Education, a large trophy room, basketball and handball courts, fencing, boxing, and wrestling rooms, and locker rooms with accommodations for the entire student body.

The gymnasium is equipped with modern appliances for recreative and corrective exercises, also with apparatus for calisthenics and other gymnastics, both for individual and for class work. In addition to numerous hot and cold shower baths, adjoining the locker rooms is a swimming pool, 75 by 25 feet, with a depth from $4\frac{1}{2}$ feet to $9\frac{1}{2}$ feet. The capacity of the swimming pool is 95,000 gallons.

Adjoining the gymnasium and the stadium is the Taylor field house. It is two stories in height, and has dressing rooms, lockers, and shower baths for visiting and Lehigh teams.

TAYLOR FIELD

An athletic field of more than nine acres in area is provided for the accommodation of students who participate in the various outdoor sports. The Stadium, located on the lower level, provides football and baseball fields. It is surrounded by concrete stands having a seating capacity for more than 12,000 spectators. On the upper level there are practice fields for football, baseball, lacrosse, and soccer; also a quarter mile track and a 220-yard straightaway. During the winter months a wooden outdoor running track, twelve laps to the mile, is provided.

LEHIGH FIELD

An additional athletic field of ten acres in area, with field house and covered grandstand, is located about a mile from the University campus.

ARMORY

During the summer of 1926 the building originally erected as the University Commons was renovated to adapt it to the needs of the Department of Military Science and Tactics. The building contains the offices, class rooms, storage rooms, and indoor rifle and pistol range of that department.

THE JAMES WARD PACKARD LABORATORY OF ELECTRICAL AND MECHANICAL ENGINEERING

The late James Ward Packard, who was graduated from Lehigh University in 1884 with the degree of Mechanical Engineer, the designer of the first Packard motor car, the founder of the Packard Motor Car Company of Detroit, Michigan, and of the Packard Electric Company of Warren, Ohio, donated \$1,200,000.00 for the erection and equipment of an electrical and mechanical engineering laboratory.

The Packard Laboratory, occupied in the fall of 1929, is a five-story steel framed limestone building 225 feet long and 180 feet wide. The lobby is finished in Italian travertine. The halls throughout the building are wainscoted with Tennessee marble. An auditorium on the first floor with a seating capacity of 622 is equipped with moving picture machine and projection lantern.

The western half of the James Ward Packard Laboratory is devoted to the work of the department of Electrical Engineering. The eastern half of the building houses the department of Mechanical Engineering with offices, drawing rooms, class rooms, research rooms, reading and study room, shops, instrument rooms, and laboratories.

SAYRE PARK

A development of the mountain side of the University grounds was effected through the donation to the University in 1909 of the sum of \$100,000.00 by the children of the late Robert H. Sayre, to be applied and used in the development of Sayre Park as a memorial to their father, who was a Trustee of the University from its foundation in 1866 to his death in 1907.

THE ARBORETUM

The Arboretum is a tract of about eleven acres adjoining Sayre Park. It was established by a friend of the University as a tree nursery for the purpose of furnishing illustrative specimens of American trees, and of cultivating trees and shrubs for the beautifying of the Park. All of the more important species of North American trees are to be found in the University Park and the Arboretum. Adjoining the Arboretum a tract of seven acres has been planted with a variety of indigenous trees as an exhibition growth of tree culture.

SCHOLARSHIPS

UNIVERSITY SCHOLARSHIPS

The following scholarships are awarded annually:

1. Six free and ten deferred tuition scholarships to freshmen students, each of whom must present to the Committee on Scholarships and Loans satisfactory evidence that

(a) He is in need of financial assistance;

(b) He attained an average scholastic record which placed him in the highest third of his class in the high school or preparatory school from which he was graduated;

(c) His character and personality are such as to give promise that he will profit by a college education.

2. Eighteen free and thirty deferred tuition scholarships to students above the grade of freshmen, each of whom has completed at least one full year's work at the University and can present to the Committee on Scholarships and Loans satisfactory evidence that

(a) He is in need of financial assistance;

(b) During the previous academic year he has secured an average grade of C (approximately 10% above the passing grade) in academic subjects, i.e., subjects other than physical education and chapel.

(c) His character and personality are such that the University may properly assist him to complete his education.

3. Thirty-six deferred tuition scholarships to students in any class at the discretion of the Committee on Scholarships and Loans. These scholarships are subject to the foregoing requirements.

In no case is a scholarship awarded for more than one academic year in advance. Reappointments are subject to the foregoing regulations.

In connection with the administration of the deferred tuition scholarships, interest on the notes given in lieu of tuition is charged at the rate of 6% per annum beginning on the day the student is graduated or otherwise withdraws from the University.

Payment of deferred tuition is made in monthly instalments beginning three months after a student's graduation or withdrawal from the University, at the rate of \$15.00 per month during the first year and \$20.00 per month thereafter.

Applications for scholarships are regularly considered by the Committee on Scholarships and Loans on July first of each year. Applicants for freshman scholarships must submit, prior to July first, records of their academic work and statements from the principals of the schools they have attended concerning their relative class standing.

THE WILBUR SCHOLARSHIP

The Wilbur Scholarship, founded in 1872 by the late E. P. Wilbur, provides the sum of \$200.00 which is awarded annually to the student in the sophomore class having the best record.

THE HENRY S. HAINES MEMORIAL SCHOLARSHIP

Mrs. Henry S. Haines, of Savannah, Ga., established in 1889 a scholarship of the annual value of \$200.00 as a memorial to her son, Henry Stevens Haines, M.E., a member of the class of 1887. By terms of the bequest this scholarship is awarded to a student in the curriculum in Mechanical Engineering. The requirements governing the award of University scholarships apply likewise to this scholarship.

THE FRED. MERCUR MEMORIAL FUND SCHOLARSHIPS

Friends of the late Frederick Mercur, of Wilkes-Barre, Pa., General Manager of the Lehigh Valley Coal Company, desiring to establish a memorial of their friendship and esteem, and to perpetuate his memory, contributed and placed in the hands of the Trustees of the University a fund called The Fred. Mercur Memorial Fund. The income from this fund, amounting to \$600.00 annually, is awarded to students of the University. The requirements governing the award of University scholarships apply likewise to these scholarships.

THE RAY SANDS NOSTRAND SCHOLARSHIP

The Ray Sands Nostrand Scholarship was established by the late Benjamin B. Nostrand, jr., M.E., '78, in memory of his son, Ray Sands Nostrand, '17. The income from this fund, amounting to \$500.00 annually, is awarded to students of the University. The requirements governing the award of University scholarships apply likewise to this scholarship.

ENDOWED SCHOLARSHIPS

Undergraduate scholarships named to honor an individual or corporation may be established in perpetuity through the payment to the Board of Trustees of Lehigh University of \$10,000.00. The income from this donation will be paid to the holder of the scholarship to be applied towards the payment of University fees. The University will not, however, guarantee that this income will be forever sufficient to pay such fees in full.

FINANCIAL AID

LOANS

A student who gives satisfactory evidence of his inability to pay his expenses may apply for aid from the loan funds of the University. A student to whom a loan is granted gives a note endorsed by his parent or guardian, bearing interest at the legal rate from the date of the loan, and payable at some fixed date agreed upon. The granting of a loan is based on a knowledge of the needs of each applicant; the decision in each case is determined by all available information, and such information is treated as confidential.

The Committee on Scholarships and Loans must be thoroughly convinced of the student's inability to pay his expenses; if it is found that an application is made as a matter of convenience to avoid the necessity of earnest effort on the part of the applicant or of his parents to obtain the necessary money from relatives or friends or from a bank, the Committee will consider such information as ground for the refusal of a loan.

The Committee may at any time require from a student to whom a loan is granted a statement of his expenses while at the University. Expenditures above what is necessary for books, instruments, and laboratory fees, and for suitable but inexpensive board and lodging, will be considered as evidence that the student's circumstances are not in accord with his statement that it is impossible for himself or his parents to pay or provide for his expenses.

A loan is granted, as a rule, only to a student who has made a good record in the University. A loan is not ordinarily granted to a student during his first year of attendance.

THE ECKLEY B. COXE MEMORIAL FUND

In memory of the late Eckley B. Coxe, Trustee of the University, Mrs. Coxe established a fund, now amounting to \$66,497.87, the interest of which is used, under the direction of the Trustees of the University, and subject to such regulations as they may adopt, for the assistance of worthy students requiring financial aid.

THE FRANK WILLIAMS FUND

Frank Williams, B.S., '87, E.M., '88, who died in October, 1900, bequeathed to the University the greater part of his estate to found a fund, now amounting of \$163,455.79, the income of which is lent to deserving students.

THE PRESIDENT'S FUND

The President's Fund was established during the early years of the University for the help of deserving students. As payments are made by former beneficiaries they are immediately available for the assistance of students of the University.

THE FRAZIER AND RINGER MEMORIAL FUND

The Frazier and Ringer Memorial Fund was established in 1906 by the late Robert H. Sayre, in memory of Benjamin West Frazier, A.M., Sc.D., former Professor of Mineralogy and Metallurgy, and Severin Ringer, U.J.D., former Professor of Modern Languages and Literature and of History, each of whom faithfully served Lehigh University for one-third of a century. The income of this fund, which now amounts to \$4,611.71, and payments made by former borrowers are available for loans to cover the medical and surgical care of worthy students.

RESEARCH FELLOWSHIPS

Applications for appointment to the following research fellowships may be submitted by graduates in engineering or science of colleges, universities, and technical schools whose requirements for graduation are substantially the same as those at Lehigh University. Applications should be sent to the President of Lehigh University, Bethlehem, Pa., on or before March 1. Each application for a fellowship should be accompanied by a catalogue of the institution from which the

applicant was graduated, a certificate of his college work, a statement concerning his practical experience, and any other evidence of his qualifications for the position which he may choose to submit. An applicant must indicate the line of graduate study he desires to undertake and his special qualifications for such work.

Holders of fellowships, who also pursue graduate work at the University, are exempt from the payment of University fees except the matriculation fee and the graduation fee. Holders of fellowships are not permitted to accept any kind of employment for pay during the period covered by their appointments.

NEW JERSEY ZINC COMPANY RESEARCH FELLOWSHIP

The New Jersey Zinc Company provided funds in 1924 for a research fellowship to be known as The New Jersey Zinc Company Research Fellowship, which is administered under the following regulations:

Appointment to this fellowship is for the period of two academic years, beginning September 1 and ending June 30, with an annual stipend of \$600.00 payable in ten installments. Half of the time of the holder of this fellowship must be devoted to research work in the department to which he is assigned; the other half to graduate study leading to a Master's degree at the end of the two year appointment providing all University requirements for this degree have been satisfied. The holder of this fellowship is required to devote approximately ninety hours a month independently of University holidays to research work assigned to him in the department to which he is attached.

THE HENRY MARISON BYLLESBY MEMORIAL RESEARCH FELLOWSHIPS

In 1926 Mrs. H. M. Byllesby, widow of Col. H. M. Byllesby, M.E., '75, President of the Byllesby Engineering and Management Corporation, provided an endowment fund for the establishment of the Henry Marison Byllesby Memorial Research Fellowships in Engineering. The income provides for two fellowships which carry an annual stipend of \$750.00, payable in ten monthly installments.

Appointments are for two collegiate years. Half of the time of the holders of these fellowships must be devoted to research work on some problem in electrical, mechanical, or hydraulic engineering, proposed by the President of the Byllesby Engineering and Management Corporation and approved by the Lehigh Institute of Research; the other half to graduate study leading to the degree of Master of Science at the end of the two year appointment, provided that all the University requirements for this degree have been satisfied.

**THE JAMES WARD PACKARD RESEARCH FELLOWSHIP IN
ELECTRICAL OR MECHANICAL ENGINEERING**

The income from a bequest from James Ward Packard, M.E., '84, has been set aside by the Board of Trustees for a research fellowship in either Electrical or Mechanical Engineering, with an annual stipend of \$600.00 for each of two years of ten months covered by an appointment.

**THE C. KEMBLE BALDWIN RESEARCH FELLOWSHIP IN
AERONAUTIC ENGINEERING**

A fund provided by Mrs. C. Kemble Baldwin as a memorial to her husband, C. Kemble Baldwin, M.E., '95, provides for the occasional appointment of a research fellow in any branch of science having a bearing on the field of aeronautics, with a stipend of \$750.00 a year for each of two years of ten months covered by an appointment.

**THE BARRETT AND COMPANY RESEARCH FELLOWSHIP
IN LEATHER TECHNOLOGY**

Barrett and Company, of Newark, N. J., has established a research fellowship in leather technology for the term of two years beginning July 1, 1929, with an annual stipend of \$900.00 for each of the two years covered by the appointment.

**THE HUNT-RANKIN LEATHER COMPANY RESEARCH
FELLOWSHIP IN LEATHER TECHNOLOGY**

The Hunt-Rankin Leather Company has established two research fellowships in leather technology for the term of one year beginning July 1, 1930, with a stipend of \$900.00 each, payable in twelve installments.

**THE ARCHER-DANIELS-MIDLAND COMPANY AND THE
WILLIAM O. GOODRICH COMPANY RESEARCH
FELLOWSHIPS**

Five research fellowships, carrying an annual stipend of \$900.00 each, were established in the fall of 1927 by the Archer-Daniels-Midland Company, of Minneapolis, Minn., and the William O. Goodrich Company, of Milwaukee, Wis., for research in linseed and other drying oils.

THE STUDENT CHEMISTRY FOUNDATION

In the spring of 1927 members of the Class of 1930 established the Student Chemistry Foundation in honor of Harry M. Ullmann, Head of the Department of Chemistry. This fund provides two research fellowships for Lehigh University graduates only carrying an annual stipend of \$750.00 each.

THE LEHIGH INSTITUTE OF RESEARCH FELLOWSHIPS

Four fellowships have been established by the Trustees of the University, for research in various fields of science and technology. Appointments to these fellowships are for a period of two years of ten months each. The stipend is \$600.00 annually.

**THE ENGINEERING FOUNDATION RESEARCH
FELLOWSHIPS**

Two fellowships, carrying an annual stipend of \$750.00 for ten months, for research in metallurgy have been established by the Engineering Foundation.

ENDOWED FELLOWSHIPS

Research fellowships named in honor of an individual or a corporation offering opportunities for graduate work and training in research in any designated field of study may be established in perpetuity through the payment to the Board of Trustees of \$20,000.00. The income from this fund will be paid to the holder of the fellowship after the deduction of his tuition and laboratory fees. If a bequest for the establishment of a fellowship provides for half-time service as a research assistant in the Institute of Research, the remaining time to be devoted to graduate study, the University will remit the tuition fee and make only such charges against the fund as are necessary to cover the cost of materials, supplies, and apparatus that need to be provided for the work of the fellow.

PRIZES

THE WILBUR PRIZES

A fund was established by the late E. P. Wilbur for distribution in prizes as the Faculty may determine. This fund yields an annual income of \$100.00.

THE JOHN B. CARSON PRIZE

An annual prize of \$50.00 was established in 1909 by Mrs. Helen B. Turner, of Philadelphia, Pa., in memory of her father, John B. Carson, whose son, James D. Carson, was a graduate of the Civil Engineering curriculum of Lehigh University in 1876. It is awarded for the best thesis by a senior of the curriculum in Civil Engineering.

THE WILLIAM H. CHANDLER PRIZES IN CHEMISTRY

Four annual prizes of \$25.00 each, one in each class, for excellence in the curricula in Chemistry and Chemical Engineering, were established in 1920 by the gift of Mrs. Mary E. Chandler, of Bethlehem, Pa., widow of Dr. William H. Chandler, who was Professor of Chemistry in Lehigh University from 1871 until his death in 1906. In memory of Dr. Chandler the Faculty named the prizes "The William H. Chandler Prizes in Chemistry."

THE ELECTRICAL ENGINEERING PRIZE

An annual prize of \$25.00, established by an anonymous graduate of the curriculum in Electrical Engineering, is awarded to the member of the graduating class presenting the best thesis in Electrical Engineering.

THE PHILIP FRANCIS DU PONT MEMORIAL THESIS PRIZE IN ELECTRICAL ENGINEERING

The Philip Francis du Pont Memorial Thesis Prize Fund was established in 1929 by L. S. Horner, E.E., '98. The annual income of this fund, \$150.00, is awarded each year as two prizes of \$100.00 and \$50.00 for the best senior theses in Electrical Engineering. The subject for 1930-1931 is: "Correction of power factor on an induction motor used as an individual drive on any type of machine tool designed to produce a metal part or piece, by the use of a static condenser,

to raise efficiency, provide more uniform speed, etc." If any year, in the opinion of the Head of the Department of Electrical Engineering, no thesis submitted is worthy of the award, the income of the fund is accumulated and added to the succeeding year's award.

ALUMNI PRIZES

By a resolution of the Alumni Association of September 21, 1900, the Alumni Scholarship Fund, which was originally designed to help poor students, was, with the consent of the contributors, diverted from this purpose and the income devoted to prizes to members of the junior class. In 1930 two prizes of \$25.00 each were awarded to the first honor men of the curricula in Mechanical Engineering and Metallurgical Engineering. In subsequent years the prizes will be awarded to the first honor men of the technical curricula in turn.

THE WILLIAMS PRIZES IN ENGLISH

Professor Edward H. Williams, jr., an alumnus of the University of the Class of 1875, established in 1900, prizes for excellence in English Composition and Public Speaking. The freshman, sophomore, and junior prizes are awarded by the Faculty on the recommendation of the Department of English.

FRESHMAN ORAL COMPOSITION PRIZES. A first prize of \$40.00 and a second prize of \$15.00 are awarded to freshmen of regular standing who excel in the oral composition contest held in May of each year.

SOPHOMORE COMPOSITION PRIZES. A first prize of \$50.00, a second prize of \$25.00, and a third prize of \$15.00, are awarded annually for the three best compositions submitted by sophomores of regular standing as required work in their English courses.

JUNIOR COMPOSITION PRIZES. A first prize of \$40.00 and a second prize of \$15.00 are awarded for the two best essays submitted by juniors as part of the required work of their courses in English.

SENIOR PRIZES. The senior prizes are awarded by the Faculty on recommendation of the Committee on Williams Senior Prizes.

1. First prizes of \$75.00 and second prizes of \$25.00 are awarded annually by each of the three Departments of Economics, English, and Philosophy and Psychology for dissertations submitted by regular members of the senior class on or before May 1st.

2. The Committee on Williams Senior Prizes publishes before the close of the University year a list of recommended subjects for dissertations, but a senior may submit a dissertation upon any other subject in the respective fields if the subject has received the approval of the Committee.

3. Every senior entering the competition shall submit to the Committee his choice of subject and plan of work by December 1st.

4. The awards are made by the Faculty upon recommendation of the Committee; but the Committee will recommend that no award be given if in any case a dissertation does not meet its standards of merit. This standard will include such points as excellence in thought, plan, development, argument, and composition.

MISCELLANEOUS

HISTORY

Lehigh University was chartered by the Legislature of Pennsylvania by an act dated February 9, 1866. In 1865 the Hon. Asa Packer, of Mauch Chunk, inaugurated a movement to provide an institution that would afford training and education in the learned professions as then recognized, and in technical branches, the importance of which was then just becoming apparent in the development of the industrial and transportation interests of the country. He made an initial donation of a large tract of land for this purpose and the sum of \$500,000.00 to which he added largely during his lifetime and by his will.

Since its foundation the equipment and resources of the University have steadily increased through the continued interest of the University's trustees, alumni, and friends. The present endowment totals \$5,285,029.04. The first important addition to the University's original plant was the Sayre Observatory, donated in 1869 by Robert H. Sayre, of Bethlehem. Later donations include Packer Memorial Church, 1887;

Williams Hall, 1902; Drown Memorial Hall, 1907; the Armory, 1907; the Wilbur Heating Plant and Engineering Laboratory, 1907; Taylor Hall, 1907; Sayre Park, 1909; the Coxe Mining Laboratory, 1910; the Fritz Engineering Laboratory, 1910; Taylor Gymnasium and Taylor Field, 1913; the Alumni Memorial Building, 1924; the James Ward Packard Electrical and Mechanical Laboratory, 1926; the Library Extension, 1928.

- GRADUATING THESES

Theses, when required, are accompanied by drawings and diagrams, whenever the subjects need such illustration. The originals are kept by the University, as a part of the student's record, for future reference, but copies may be retained by students, and may be published, permission having first been obtained from the Faculty.

PLACEMENT SERVICE

The heads of the various technical curricula of the University coöperate with graduates in securing suitable professional openings. Similarly, students who desire to teach are assisted in finding positions by the Teacher Placement Committee. Such students are put in touch, also, with the Placement Service of the Teacher Bureau of the Department of Public Instruction of Pennsylvania at Harrisburg.

STUDENTS' HEALTH SERVICE

The Students' Health Service, organized in 1923, has general charge of all health and sanitary measures in the University. The work of the department is organized under four heads: Sanitation, Physical Examinations, Dispensary Service, Education.

SANITATION. The Director of the Health Service is in direct charge of the sanitation of University buildings and grounds, and exercises such supervision as is possible over other accommodations for students.

PHYSICAL EXAMINATIONS. Each student is required to undergo a complete physical examination each year. This examination, which is made jointly by the Health Service and the Department of Physical Education, serves the needs of both these departments and also complies with the requirements of

the Reserve Officers' Training Corps. All physical defects and departures from normal are noted, and the students are divided into groups as follows: (1) those who present no abnormalities and who can proceed with the regular mental and physical work of the University, (2) those who are abnormal or sub-normal, but who should be brought up to normal by the regular courses in Physical Education, (3) those who require special or corrective measures.

Students who fall into groups 2 and 3 are observed at regular intervals, and every effort is made to bring them up to the highest degree of physical development and health. Individual records are kept of the progress of each case.

DISPENSARY SERVICE. The Health Service maintains a dispensary in Saucon Hall where students may receive free treatment for minor illnesses and injuries. The Dispensary hours are from 8.30 to 12.00 a.m. on all week days, from 1.30 to 5.00 p.m. on week days except Saturday, and from 10.00 to 12.00 a.m. on Sunday. A physician and a nurse are on duty in the dispensary during these hours. While the Health Service does not furnish medical attendance to students who are sick in their rooms, the Director keeps in touch with such cases by telephone and otherwise in so far as is possible in order to see that the students are receiving proper attention and that the time lost from University work is minimized. It is requested that all such cases, together with the names of the attending physicians, be reported to the Director in order that complete records of the health of the students may be kept.

EDUCATION. A course in Personal and Social Hygiene is given to freshmen by the Director of the Health Service in conjunction with the Departments of Biology and Physical Education. In this course emphasis is laid on those points of personal hygiene most applicable to the student recently deprived of the atmosphere and influences of home. In social hygiene an effort is made to disseminate correct information concerning the history and present status of social diseases and the effectiveness of approved methods for the relief of existing conditions. This phase of the Health Service constitutes a specific part of the general program of instruction recommended by the State Board of Health and by other recognized organizations for the promotion of social hygiene.

BUREAU OF STUDENT EMPLOYMENT AND HOUSING

The Bureau of Student Employment and Housing is in charge of an officer of the University who is at all times at the service of students in matters pertaining to housing and remunerative employment while the University is in session.

LEHIGH UNIVERSITY UNION

The Lehigh University Union is a voluntary organization of students for the promotion of the religious, moral, and social life of the University. The movement is distinctly for and by students, all the officers, with the exception of the General Secretary, being chosen from the student body.

BOARD OF CONTROL OF ATHLETICS

The management of intercollegiate athletics is vested in the Board of Control of Athletics, which consists of four members of the Faculty, four alumni elected by the Directors of the Alumni Association, and four undergraduates. The Graduate Manager is the executive officer of the Board.

The membership of the Board of Control of Athletics for the year 1930-1931 is as follows:

Faculty: Professors H. R. Reiter, Neil Carothers, J. S. Long, R. C. Bull.

Alumni: Messrs. W. R. Okeson, '96; J. A. Frick, '03; D. M. Petty, '09; M. L. Jacobs, '10.

Undergraduates: G. B. Camden, E. F. Evers, A. T. McElroy, H. W. Ruggles.

Graduate Manager: J. G. Petrikin, '96.

HONORARY SCHOLARSHIP SOCIETIES

PHI BETA KAPPA. Students in the College of Arts and Science and the College of Business Administration who up to the middle of the senior year maintain high scholarship may be elected to membership; also a limited number of engineering students whose work in philosophical, scientific, and language studies is of high grade.

TAU BETA PI. This national honorary society, which now has forty-one chapters, was founded at Lehigh University in 1885, under the auspices of Professor E. H. Williams, jr. Students in the College of Engineering who up to the middle of

the junior year maintain high scholarship may be elected to membership.

SIGMA XI. Election to membership is based upon the completion of original and noteworthy research in pure or applied science and the publication of the results thereof. Ordinarily undergraduates are eligible to associate membership only, their election being based upon their promise of achievement in scientific research.

PI TAU SIGMA (Mechanical Engineering). Students in the curriculum in Mechanical Engineering who up to the middle of the senior year maintain high scholarship may be elected to membership.

COURSE SOCIETIES

Intellectual interest in various fields of study and professional spirit among pre-medical, pre-legal, business, and engineering students are promoted by a group of organizations commonly called Course Societies. The first of these organizations historically was the Chemical Society, established in 1871. The list now includes:

In Arts and Science

Delta Omicron Theta (public speaking)
Deutscher Verein
Ernest W. Brown Astronomical Society
Eta Sigma Phi (classics)
International Relations Club (history and government)
Newtonian Society (mathematics)
Pi Mu Epsilon (mathematics)
Pre-Legal Society
Robert W. Blake Society (philosophy, psychology, and education)
Robert W. Hall Pre-Medical Society

In Business Administration

Alpha Kappa Psi (professional business administration fraternity)

In Engineering

Chemical Society
Civil Engineering Society (student branch of the A. S. C. E.)

Electrical Engineering Society (student branch of the A. I. E. E.)
Industrial Engineering Society
Mechanical Engineering Society (student branch of the A. S. M. E.)
Metallurgical Society
Mining and Geological Society (student branch of the A.I.M.E.)
Physical Society
Radio Club

OTHER ORGANIZATIONS

Other student organizations include:

Arcadia (student self-government council)
Lehigh Union (general students' social organization)
Interfraternity Council
Omicron Delta Kappa (senior honorary fraternity)
Sword and Crescent (senior honorary society)
Cyanide Club (junior honorary society)
Phi Club (sophomore honorary society)
Pi Delta Epsilon (honorary journalistic fraternity)
Scabbard and Blade (honorary military fraternity)
Spiked Shoe (honorary fraternity, track athletics)
Mustard and Cheese (dramatic club)
Musical Clubs, Combined
Lehigh Band
Fencing Club
St. Paul's Society (Episcopalian club)
Allen-Lehigh Club (Lehigh students resident in Allentown)
Eta Kappa Nu (electrical engineering)

The following Greek letter fraternities have chapters at Lehigh University: Alpha Chi Rho, Alpha Kappa Pi, Alpha Tau Omega, Beta Theta Pi, Chi Phi, Chi Psi, Delta Phi, Delta Tau Delta, Delta Upsilon, Kappa Alpha, Kappa Sigma, Lambda Chi Alpha, Omega Phi Sigma (local), Phi Beta Delta, Phi Delta Pi (local), Phi Delta Theta, Phi Gamma Delta, Phi Sigma Delta, Phi Sigma Kappa, Pi Kappa Alpha, Pi Lambda Phi, Psi Upsilon, Sigma Alpha Mu, Sigma Chi, Sigma Nu, Sigma Phi, Sigma Phi Epsilon, Tau Delta Phi, Theta Delta Chi, Theta Kappa Phi, Theta Xi.

STUDENT PUBLICATIONS

The students of Lehigh University publish a semi-weekly college newspaper, *The Lehigh Brown and White*; a quarterly magazine, *The Lehigh Review*; a comic monthly, *The Lehigh Burr*; and a year-book, *The Epitome*.

FOUNDER'S DAY

The second Wednesday following the opening of the University in each year is celebrated as Founder's Day in honor of the Founder of the University, Asa Packer. Degrees are conferred and freshman and sophomore honors and prizes are announced.

At the exercises on October 1, 1930, the fifty-first Founder's Day, an address entitled "The Nature of Progress" was delivered by Edward Wilber Berry, Sc.D., Professor of Paleontology and Dean of Johns Hopkins University.

UNIVERSITY SUNDAY

The Sunday preceding University Day is known as University Sunday, and is devoted to the Baccalaureate Service. The Baccalaureate Sermon on June 1, 1930, was preached by the Very Rev. Daniel Wilmot Gateson, B.A., M.A., Chaplain of the University.

UNIVERSITY DAY

University Day marks the close of the collegiate year. On this day the graduation exercises are held, an address is given, senior honors and prizes are announced, and degrees are conferred. The address at the exercises on June 10, 1930, was given by George Edgar Vincent, A.B., Ph.D., LL.D., President Emeritus of the Rockefeller Foundation.

THE ALUMNI ASSOCIATION

The Alumni Association, which has been in existence since 1876, was incorporated in 1917 under the name The Alumni Association of the Lehigh University, Inc. The offices of the Association are in the Alumni Memorial Building. The Secretary, who is a permanent officer, edits the *Lehigh Alumni Bulletin*, a news publication issued monthly from October to July, inclusive, and the *Directory of Alumni and Students*. The Association is largely concerned with raising money to meet the needs of the University.

The officers and directors of the Alumni Association for 1930-1931 are:

President, A. C. Dodson, '00, of Bethlehem, Pa.
Vice-President, C. S. Kenney, '10, of Bethlehem, Pa.
Vice-President, A. V. Bodine, '15, of Bridgeport, Conn.
Treasurer, R. S. Taylor, '95, of Bethlehem, Pa.
Secretary, A. E. Buchanan, jr., '18, of Bethlehem, Pa.
Archivist, J. L. Beaver, '04, of Bethlehem, Pa.

Honorary Alumni Trustees: Aubrey Weymouth, '94, of New York, N. Y.; Clarence W. Hudson, '89, of New York, N. Y.; Cadwallader Evans, jr., '01, of Scranton, Pa.; R. F. Dravo, '87, of Pittsburgh, Pa.; T. M. Girdler, '01, of Cleveland, O.; and A. R. Glancy, '03, of Pontiac, Mich.

The following are the local alumni clubs: New York Lehigh Club, Philadelphia Lehigh Club, Pittsburgh Lehigh Club, Chicago Lehigh Club, Washington Lehigh Club, Detroit Lehigh Club, Cincinnati Lehigh Club, Northeastern Pennsylvania Lehigh Club (Scranton and Wilkes-Barre, Pa.), Maryland Lehigh Club (Baltimore, Md.), Lehigh Club of New England (Boston, Mass.), Lehigh Club of Central Pennsylvania (Harrisburg, Pa.), Lehigh Club of Northern New York (Schenectady, N.Y.), Lehigh Club of Northern Ohio (Cleveland, O.), Lehigh Club of Southern New England (Hartford, Conn.), Lehigh Club of Western New York (Buffalo, N.Y.), Southern Anthracite Lehigh Club (Pottsville, Pa.), Lehigh Home Club (Bethlehem, Pa.), Lehigh Club of China (Wuchang, China), Lehigh Club of Cuba (Havana, Cuba), Lehigh Club of Southeastern Pennsylvania (Reading, Pa.), Lehigh Club of Trenton (N.J.), Lehigh Club of York (Pa.), Lehigh Club of Northern New Jersey (Newark), Lehigh Club of Northern California (San Francisco), Lehigh Club of Southern California (Los Angeles).

DEGREES

Conferred on University Day, June 10, 1930

HONORARY DEGREES

DOCTOR OF SCIENCE

Nicholas Hunter Heck, B.A., C.E. Washington, D.C.

DOCTOR OF ENGINEERING

Thaddeus Merriman, C.E. New York, N.Y.

DEGREES IN COURSE

MASTER OF ARTS

Major in Education

Edwin Van Keuren, B.A. Lebanon
(*Lehigh University*)

MASTER OF SCIENCE

Major in Chemistry

George Loyal Ball, Jr., B.S. in Chem. Pittsburgh
(*Pennsylvania State College*)

Paul Vincent Hartman, B.A. Bethlehem
(*Moravian College*)

John De Haven Long, B.S. Lancaster
(*Franklin and Marshall College*)

Theodore Henry Marshall, B.S. Waterloo, Ia.
(*Iowa State College*)

John Zollinger Miller, Ch.E. Harrisburg
(*Lehigh University*)

Charles Tilghman Oswald, Ch.E. Fullerton
(*Lehigh University*)

Major in Metallurgy

Earl Shirk Greiner, B.S. in Met.E. Lebanon
(*Carnegie Institute of Technology*)

Wilber Edward Harvey, Met.E. Catasauqua
(*Lehigh University*)

BACHELOR OF ARTS

Henry Mason Adams	Fall River, Mass.
Ralph Waldo Barthold	Bethlehem
James Wilson Beck	Millville, N.J.
Warren Henry Bennett	Rockville Centre, N.Y.
Robert Irving Blair	River Edge, N.J.
Zachary Boosin	New York, N.Y.
Hugh Witherow Castles	Philadelphia

Irving Milton Clyne	Far Rockaway, N.Y.
Thomas Joseph Conahan, Jr.	Hazleton
Arthur Maxwell Davidowitz	Scranton
Edward Russell Davis	Collingswood, N.J.
Julius Dimont	Staten Island, N.Y.
Virgil Augustus Doss	Hawthorne, N.J.
William Gordy Figoni	Springfield, Mass.
Leonard Baxter Frutkin	Mount Vernon, N.Y.
Roy Andrew Gade	Metuchen, N.J.
Samuel Solomon Gidding	Wildwood, N.J.
Joseph Lincoln Goldberg	Brooklyn, N.Y.
Israel Payson Goldstein	East Taunton, Mass.
Vaughan Haag	Philadelphia
John Newton Hall	Carlisle
Bernard Robert Hamburger	New York, N.Y.
Dudley Lee Harley	Martinsburg, W.Va.
Brooke Rapp Hartman	Allentown
Arthur Parker Helms	Brooklyn, N.Y.
David Drescott Hendlin	New York, N.Y.
Robert Chester Hoag	Newark, N.J.
Richard Joseph Hoffman	Allentown
Albert Cronquist Johnson	Bridgeport, Conn.
Preston Gould Justice	Bethlehem
Edward Kahn	Allentown
Edward Stanley Keith	Sandy Run
Edward Monroe Koch	Reading
Milton Kramer	Allentown
Llewellyn Laws, Jr.	Philadelphia
Fred Leitner	Brooklyn, N.Y.
Linwood Glen Lessig	Pottstown
Aaron Reuben Levy	Brooklyn, N.Y.
Louis Joseph Licciardi	Brooklyn, N.Y.
Richard Patrick Lyman	Hazleton
Philip Raymond Muldberg	New York, N.Y.
Henry H. Ogden	New York, N.Y.
Edward Stanley Olmsted	Burnside, Conn.
Gabriel Martin Ondeck	Hazleton
Harold Phillips	Bethlehem
Stanley Winter Pratt	Nanticoke
Herman Anthony Schick	Rosebank, N.Y.
George Weber Schoenhut	Philadelphia
Max Schultz	Philadelphia
Harold Milton Schwartz	Brooklyn, N.Y.
Harold Aloysius Seward	Parkersburg, W.Va.
Murray William Shulman	Irvington, N.J.
Irving Michael Siegel	New York, N.Y.
Sidney Melvin Simmons	Roxbury, Mass.
Sidney Slosberg	Trenton, N.J.
Herman Sulken	Brooklyn, N.Y.
Stephen Bella Toth	Bethlehem

Arthur Mandel Tunick	New York, N.Y.
Sydney Delwin Walters	Trenton, N.J.
John Waldner Watters	Ashland
Robert Louis Wiener	New York, N.Y.
Lloyd Garrison Wilson	New York, N.Y.
Frederick Albert Wyckoff, Jr.	New York, N.Y.

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION

Robert Alder, Jr.	Woodcliff, N.J.
Frederick Simon Barker	Bridgeton, N.J.
Gared Clemens Landes Barnes	Haddonfield, N.J.
Robert Sherman Bennett	East Orange, N.J.
William Edgar Blackmar	East Orange, N.J.
Clayton Sumner Boies, Jr.	Seymour, Conn.
Jack Baldwin Brown	Scranton
Thomas John Callan	Flushing, N.Y.
Merritt Robert Clifton	Baltimore, Md.
Joseph William Cochran, Jr.	Williamsport
James Vallance Collins	Rome, N.Y.
George Howard Cross, Jr.	Swarthmore
Alfred Jeremy Davis	Scranton
John Stanley Dew	Newark, N.J.
Joseph Harold Elliott	Marcus Hook
Edward Epstein	Easton
George Hayes Feakins	Swarthmore
John David Fenner	South Orange, N.J.
John Edward Fulmer	Bethlehem
Jonathan J. Geisel	McKeesport
Hadley Alden Hallock	Palmerton
Frank Patterson Hill, Jr.	Philadelphia
William Joseph Hutchins	East Orange, N.J.
Robert Vaughan Jones	Brooklyn, N.Y.
Edward Morris Lawrence	Salem, N.J.
Raymond Harper Lewis	Buffalo, N.Y.
Leonard Charles Marcus	Atlantic City, N.J.
John Charles McAlarney, Jr.	Plymouth
John McLachlan, Jr.	East Elmhurst, N.Y.
William Edward Miller, Jr.	Baltimore, Md.
Stuart Alexander Monroe	Hazleton
Robert Lee Myers, Jr.	Linwood, Md.
William Frederick Powell, Jr.	Philadelphia
Stephen Webbe Ransom	Bloomfield, N.J.
Robert Morris Reese	Kingston
Henry Rohrs	Ridgewood, N.J.
Walter Edmond Rotthaus	Allentown
Wesley Hughes Seaton	Oil City
Julius Seligson	New York, N.Y.
Melchior Harry Smith	Columbus, O.
William Harry Snyder, Jr.	Newport
John Jeffrey Somerville	Bethlehem

Bennett Strauss Sprinz	New York, N.Y.
Edmund Arthur Staub	Millburn, N.J.
Robert Henry Stauffer	Leola
Leonard Myron Taylor	Newark, N.J.
George Washington Thomas	Plymouth
Guy Marston Vroman	Larchmont, N.Y.
Edwin Penrose Werley	Allentown

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

Robert Lee Anderson	Worcester
Lewis William Becker, Jr.	Trenton, N.J.
Leonard Muhlenberg Bennetch	Lebanon
Hugh Francis Burns	Catasauqua
Kenneth Allen Earhart	Avonmore
Richard Wilton Hurley	Belmar, N.J.
Mearl Alton Kise	Allentown
Louis Alan Lubow	Vineland, N.J.
Harold John Muendel	Woodcliff, N.J.
Alfred Nathan Rogers	Reading
Andrew Reynolds Secor	Scarborough, N.Y.
Dean Amandus Shenton	Slatington
Arthur Levern Smith	Coatesville
William Worley TenEyck	Washington, D.C.
Joseph Charles Werner, Jr.	Hasbrouck Heights, N.J.
Albert Howard Zeigler	Norristown

BACHELOR OF SCIENCE IN CHEMISTRY

Alvin Jacob Frantz	Allentown
William Schuyler Miller	Allentown
Carl Richard Woll	Philadelphia

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Horace Allan Barnes	Philadelphia
Daniel Joseph Barrows	New York, N.Y.
Charles Henry Bauer, Jr.	East Orange, N.J.
Lee Calvin Boyer	Shamokin
Paul Albert Brosz	Philadelphia
George Cliff Calder	Lancaster
John Kearney Conneen	Maplewood, N.J.
John Kendig Deichler	Upper Darby
John Wotring Fullagar	Catasauqua
Paul Eugene Gettys	Harrisburg
Robert Edgar Gohl	Harrisburg
Leslie Randall Hewitt	Ocean View, N.J.
Paul Hickman	Arlington, N.J.
Robert Bertram Job	Nanticoke
Edward Jackson Jones	Ishpeming, Mich.
Raymond Arthur Karr	West Reading
William Dunham Kelly, II	Philadelphia
Robert Patterson Kline	Monongahela

Carl Lester Kreidler
 William Dean Macgeorge
 Henry Edward Michael
 Donald Douglas Morton
 Willard Mohr Moyer, B.S.
(Ursinus College)

George Sandt Opp, Jr.
 Budd Overfield
 Louis Pailey
 Henry Gilbert Pratt, Jr.
 John Earl Spangler
 Donald Billman Stabler
 Frederick William Tillinghast
 Richard Tull
 George Chandler Vaughan
 Howard Wardle
 James Paul Zearley
 James Alexander Zipser

Bethlehem
 Vineland, N.J.
 Holtwood
 Woodhaven, N.Y.
 Quakertown

Philadelphia
 Bethlehem
 Williamstown
 Washington, D.C.
 York
 Williamsport
 Baltimore, Md.
 Fanwood, N.J.
 Washington, D.C.
 Philadelphia
 Uniontown
 New York, N.Y.

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Charles Russell Bachman
 Robert Alt Baker
 Edward Stephen Brotzman
 James Rue Campbell
 Stanley Clinton Diehl
 Anthony Jack Falcone
 William Romig Foley
 Ruel Billings George
 Arthur Franklin Griffith
 David Pendril Griffith
 Evans Maitland Healy
 Robert Ashton Herbruck
 Lester Carl Herman
 John Edwin Johnson
 Charles Preston John King
 Stephen Albert Kuntz
 Francis Earl Loomis
 Edward Stanley Phelps
 Frank Graham Potter
 Lloyd DeForest Simonson
 Harry Frederick Singer
 Charles Albert Stay
 Bentley Otto Steinert
 Raymond Eugene Stocker
 Thomas Franklin Strawn
 Louis Sussman
 Samuel Robert Van Blarcom
 William Henry Vroom
 David Eugene Walbert
 Edward Haring Weiss

Upper Montclair, N.J.
 Reading
 Easton
 Long Branch, N.J.
 Allentown
 Roseto
 Allentown
 Tunkhannock
 Catasauqua
 Catasauqua
 Minneapolis, Minn.
 Dayton, O.
 Easton
 Collegeville
 Catasauqua
 Allentown
 Wilkes-Barre
 Rockville Centre, N.Y.
 Rockville Centre, N.Y.
 Hazlet, N.J.
 Jermyn
 Locust Valley, N.Y.
 Belle Vernon
 Easton
 Quakertown
 Allentown
 Midland Park, N.J.
 Ridgewood, N.J.
 Allentown
 Allentown

Forest Jerome Whitney, Jr.	Philadelphia
Walter Pennypacker Wills	Philadelphia
John Detwiler Woodward	Bala-Cynwyd
Henry Christian Youngken	Bethlehem
John Edward Zeaser	Catasauqua

BACHELOR OF SCIENCE IN ENGINEERING PHYSICS

Dallas Osville Burger	Allentown
David William Epstein	Bethlehem
J. Leland Myer	Leola
Robert Serber	Philadelphia
Victor Stein	Bethlehem

BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING

David Bright Atkins	Pottsville
William Gervaise Badgley, Jr.	Chatham, N.J.
Reginald Collinson Barber	Ketchikan, Alaska
Richard Douglass Chapman	Jenkintown
Kenneth Wade Goodwin	Millville, N.J.
Lyle Laughlin Jones, Jr.	Greensburg
Robert Francis Latremore	West Orange, N.J.
Robert Pierce Lentz, Jr.	Eggertsville, N.Y.
Willard Arrison MacCalla	Youngstown, O.
Robert Howland Many, Jr.	Bayonne, N.J.
Frederick Lebbeus Schumaker	Philadelphia
Thomas Franklin Storm	Pottstown
John Anderson Waterman	Pittsburgh

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Miles Shelly Christman	Trumbauersville
George Chesley Dorsett	Garwood, N.J.
Alan Wayne Dow	Brookline
Fred William Emhardt	Philadelphia
Harry Summy Keller, Jr.	Bloomsburg
John Thompson Marshall	Langhorne
John Reginald Monsell	Greenport, N.Y.
George Ellis Oller, Jr.	Philadelphia
Francis King Paget	Flushing, N.Y.
Harold Walls Semar	Philadelphia
Charles Henry Traeger, Jr.	Rock Island, Ill.
Frank Philip Tucker	Bernardsville, N.J.
Donald Lynd Wright	Philadelphia
Harry John Zimmer	Philadelphia

BACHELOR OF SCIENCE IN METALLURGICAL ENGINEERING

Theron Emmet Brower	Little Silver, N.J.
William Cooper Cuntz	Kew Gardens, N.Y.
Ernest Lang Gabler	Holyoke, Mass.
Charles Robert Wentz	Duquesne

BACHELOR OF SCIENCE IN MINING ENGINEERING

Gilbert Lafayette DeHuff, Jr.	Millville, N.J.
Joseph Hayes Girdler	Cleveland Heights, O.
Samuel Harold Thatcher	Bethlehem

COMMISSIONS AS SECOND LIEUTENANT IN THE
OFFICERS' RESERVE CORPS

INFANTRY

David Bright Atkins	Pottsville
William Edgar Blackmar	East Orange, N.J.
Donald Langlitz Bower	Harrisburg
Howard Edward Datwyler	Flushing, N.Y.
David William Epstein	Bethlehem
William High Geib	Reading
Daniel Pierson Johnson	Swarthmore
Gilbert Westmore King	Glen Ridge, N.J.
Edward Monroe Koch	Reading
Milton Kramer	Allentown
William Watt Lowry	Chicago, Ill.
Ernest Henry Noedel	Reading
George Ellis Oller, Jr.	Philadelphia
Francis King Paget	Flushing, N.Y.
William Frederick Powell, Jr.	Philadelphia
Edward Nicholas Small	Westbury, N.Y.
George Chandler Vaughan	Washington, D.C.
Paul Laurence Whims	St. Clair

ORDNANCE

James Martin Heilman	Harrisburg
Louis Alan Lubow	Vineland, N.J.
J. Leland Myer	Leola
Charles Robert Wentz	Duquesne
Walter Pennypacker Wills	Philadelphia

CERTIFICATES OF ELIGIBILITY FOR COMMISSIONS AS
SECOND LIEUTENANT IN THE OFFICERS'
RESERVE CORPS

(Commissions withheld because of the candidates
being under age)

INFANTRY

Hamilton Fairfax Allen	Forest Hills, N.Y.
Dallas Osville Burger	Allentown
Julian Douglas Dickerson	Washington, D.C.

ORDNANCE

Reginald Collinson Barber	Ketchikan, Alaska
Joseph Charles Werner, Jr.	Hasbrouck Heights, N.J.

Conferred on Founder's Day, October 1, 1930

HONORARY DEGREES

DOCTOR OF SCIENCE

Edward Wilber Berry	Baltimore, Md.
Harold Malcolm Westergaard	Urbana, Ill.

DEGREES IN COURSE

MASTER OF ARTS

Major in Education

Charles Foster Schoffstall, Ph.B.	Pottsville
<i>(Muhlenberg College)</i>	

Major in History

John Luther Eisenhard, B.A.	Topton
<i>(Muhlenberg College)</i>	
Daniel Wilmot Gateson, B.A.	Bethlehem
<i>(Trinity College)</i>	
Henry Moeller Prentiss, Ph.B.	Easton
<i>(Muhlenberg College)</i>	

MASTER OF SCIENCE

Major in Bacteriology

Michael Anthony Farrell, B.S.	Waverly
<i>(Pennsylvania State College)</i>	

Major in Chemistry

Aral Miles Hollenbach, B.S.	Allentown
<i>(Muhlenberg College)</i>	

BACHELOR OF ARTS

John Allen Bohner	Catasauqua
Roland Cannan	Philadelphia
Stephen Paul Coates	Brooklyn, N.Y.
Albert Cohen	Brooklyn, N.Y.
William High Geib	Reading
Zigmont J. Letowt, Jr.	Hazleton
Oscar Ralph Miller	Brooklyn, N.Y.
Richard Small Myers	York

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION

John Curtin, Jr.	Bellefonte
George Scott Dixon	Butler
Benjamin Leon Getz	Allentown
Edward Thomas Gorman	Allentown
Milton Lawrence Heyman	Danbury, Conn.
Hugh Horner	Bath
Paul Joseph Lembeck	Jersey City, N.J.
William Stran McCurley, Jr.	Baltimore, Md.

Gordon Prentiss Ogden
 Carl Joseph Proebstle
 Edward Nicholas Small
 Clarence Thomas Thompson

Great Neck, N.Y.
 Atlantic City, N.J.
 Westbury, N.Y.
 Morristown, N.J.

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

Dustin Yach Miller

Lyndhurst, N.J.

BACHELOR OF SCIENCE IN CHEMISTRY

Hugh Nevins

Hokendauqua

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

John Hawkins Auten
 John Richard Leader
 James Anthony Scavo

Corbett, Md.
 Shamokin
 Old Forge

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Joseph Thomas Danko
 Julian Anthony Kiep
 Conrad McLaughlin
 Edwin Raphael Roberts
 William Wynkoop

McKeesport
 Joliet, Ill.
 Philadelphia
 Mahanoy City
 Scranton

BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING

Robert Feucht

Lambertville, N.J.

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Willard Beisel Stettler

Allentown

HONORS AND PRIZES

Announced on University Day, June 10, 1930

GRADUATION HONORS

GRADUATED WITH HIGHEST HONORS

Richard Joseph Hoffman	B.A.	Allentown
Mearl Alton Kise	Ch.E.	Allentown

GRADUATED WITH HIGH HONORS

Irving Milton Clyne	B.A.	Far Rockaway, N.Y.
Arthur Maxwell Davidowitz	B.A.	Scranton
Willard Arrison MacCalla	I.E.	Youngstown, O.
William Frederick Powell, Jr.	Bus.	Philadelphia
Alfred Nathan Rogers	Ch.E.	Reading
Stephen Bella Toth	B.A.	Bethlehem

GRADUATED WITH HONORS

Frederick Simon Barker	Bus.	Bridgeton, N.J.
Edward Stephen Brotzman	E.E.	Easton
Richard Douglass Chapman	I.E.	Jenkintown
Thomas Joseph Conahan, Jr.	B.A.	Hazleton
Gilbert Lafayette DeHuff, Jr.	E.M.	Millville, N.J.

Julius Dimont	B.A.	Staten Island, N.Y.
David William Epstein	Phys.	Bethlehem
Alvin Jacob Frantz	Chem.	Allentown
Leonard Baxter Frutkin	B.A.	Mount Vernon, N.Y.
Samuel Solomon Gidding	B.A.	Wildwood, N.J.
Robert Edgar Gohl	C.E.	Harrisburg
Bernard Robert Hamburger	B.A.	New York, N.Y.
Dudley Lee Harley	B.A.	Martinsburg, W.Va.
David Drescott Hendlin	B.A.	New York, N.Y.
Robert Chester Hoag	B.A.	Newark, N.J.
Preston Gould Justice	B.A.	Bethlehem
Raymond Arthur Karr	C.E.	West Reading
Charles Preston John King	E.E.	Catasauqua
Carl Lester Kreidler	C.E.	Bethlehem
Robert Francis Latremore	I.E.	West Orange, N.J.
William Schuyler Miller	Chem.	Allentown
Willard Mohr Moyer	C.E.	Quakertown
J. Leland Myer	Phys.	Leola
Herman Anthony Schick	B.A.	Rosebank, N.Y.
Julius Seligson	Bus.	New York, N.Y.
Harold Walls Semar	M.E.	Philadelphia
Robert Serber	Phys.	Philadelphia
Irving Michael Siegel	B.A.	New York, N.Y.
Arthur Levern Smith	Ch.E.	Coatesville
William Worley TenEyck	Ch.E.	Washington, D.C.
Samuel Harold Thatcher	E.M.	Bethlehem
Richard Tull	C.E.	Fanwood, N.J.
Carl Richard Woll	Chem.	Philadelphia
Harry John Zimmer	M.E.	Philadelphia

GRADUATED WITH SPECIAL HONORS

Biology

Irving Milton Clyne	Far Rockaway, N.Y.
Murray William Shulman	Irrington, N.J.

Economics

Bernard Robert Hamburger	New York, N.Y.
--------------------------	----------------

English

Israel Payson Goldstein	East Taunton, Mass.
Dudley Lee Harley	Martinsburg, W.Va.
Arthur Parker Helms	Brooklyn, N.Y.
Stephen Bella Toth	Bethlehem

Philosophy

Leonard Baxter Frutkin	Mount Vernon, N.Y.
HONOR GRADUATES IN THE RESERVE OFFICERS' TRAINING CORPS	
William Frederick Powell, Jr.	Upper Darby
George Chandler Vaughan	Washington, D.C.

Prizes**WILLIAMS SENIOR PRIZES IN ENGLISH**

First Prize, \$75.00

Dudley Lee Harley

Martinsburg, W.Va.

Second Prizes, \$25.00

Israel Payson Goldstein

East Taunton, Mass.

Arthur Parker Helms

Brooklyn, N.Y.

WILLIAM H. CHANDLER PRIZE, \$25.00, to the highest ranking senior in the curricula in Chemistry and Chemical Engineering

Mearl Alton Kise

Allentown

JOHN B. CARSON PRIZE, for the best C.E. thesis

William Dean Macgeorge

Vineland, N.J.

PHILIP FRANCIS DUPONT MEMORIAL THESIS PRIZE IN ELECTRICAL ENGINEERING, \$100.00

Edward Stephen Brotzman

Easton

ELECTRICAL ENGINEERING PRIZE, \$25.00, for the best E.E. thesis

Charles Albert Shay

Locust Valley, N.Y.

AMERICAN SOCIETY OF CIVIL ENGINEERS JUNIOR MEMBERSHIP PRIZE, \$20.00

William Mohr Moyer

Quakertown

Announced on Founder's Day, October 1, 1930

Freshman and Sophomore Honors, 1929-1930

(Awarded to those members of the Classes of 1932 and 1933 who made an average grade of B or higher during the scholastic year 1929-1930.)

FRESHMAN HONORS

Walter Crawford Bachman

I.E. Nazareth

Frank Biro

Arts Bethlehem

Kenneth Fleming Borden

M.E. Collingswood, N.J.

Jackson Leroy Boughner

Arts Manhattan, Kan.

Ardrey Middleton Bounds

Met. Philadelphia

Henry Merritt Chapin

Ch.E. Flushing, N.Y.

Charles William Cooper

E.E. Sewickley

Charles Dickey Cox

Met. Uniontown

Russell Tattershall Dean

Ch.E. Bethlehem

Lemoyne Eugene Decker

Ch.E. Harrisburg

George Malcolm Dewees

Ch.E. West Chester

Melvin Dresher

Ch.E. Hackensack, N.J.

Walter Wiest Felton

E.E. Columbia

Pierce John Flanigan

C.E. Baltimore, Md.

Robert Hall Garrett

C.E. Frackville

Elmer William Glick

Arts Bethlehem

Abraham Grudin

Arts Hillside, N.J.

Benjamin Halpern

Bus. Pittsfield, Mass.

Clifford Earl Harrison, Jr.

Ch.E. Philadelphia

William DeForest Hickman	E.E.	Arlington, N.J.
George Henry Keller	M.E.	York
Sidney Louis Lancit	Arts	Newark, N.J.
John Williamson Langhaar	I.E.	Allentown
Eugene William Laschober, Jr.	Met.	Belvidere, N.J.
Joseph William Macalady	Ch.E.	Shamokin
Matthew John Murphy	Arts	Atlantic Highlands, N.J.
Robert Julius Myers	Phys.	Elkins Park
John Perry Nichols	I.E.	Pennington, N.J.
Edmund Howe Poggi, Jr.	I.E.	Wilkes-Barre
Martin Monroe Reed, Jr.	Arts	Philadelphia
James Crisman Rhoads	M.E.	Harrisburg
Atwood Jester Ricards	Ch.E.	Marshallton, Del.
Edward Haupt Robb	Bus.	Grand Island, N.Y.
Robert Salwen	Arts	Brooklyn, N.Y.
Benjamin Slade	Arts	Newark, N.J.
Frank Lichty Snavelly	I.E.	Lancaster
Robert Scott Taylor	Ch.E.	Pottsville
William John Taylor	Ch.E.	Pottsville
James Alvin Tempest	Arts	Catasauqua
Morris Bordner Uhrich	C.E.	Myerstown
Robert Riddell Vennum	Eng.	Wilmington, Del.
Robert Bates Wall	I.E.	Chattanooga, Tenn.
John Geyer Williams	M.E.	Bethlehem
Richard Lewis Willis	M.E.	Bethlehem

SOPHOMORE HONORS

Wilton Altman	Arts	Bethlehem
John Elmer Angle, Jr.	Met.	Mansfield, O.
William Ogle Bennett, Jr.	Phys.	Lancaster
Louis Legrand Brennesholtz	Bus.	East Orange, N.J.
Douglas Treat Davidson, Jr.	Arts	Claymont, Del.
William Cronk Elmore	Phys.	Montour Falls, N.Y.
George Willis Ely	Bus.	Holmdel, N.J.
Henry Heyward Fryling, Jr.	I.E.	South Orange, N.J.
William Kenneth Griesinger	Ch.E.	Plainfield, N.J.
Joseph John Grienevich	E.E.	Mahanoy City
Donald Wilson Haff	Arts	Northampton
Paul Hartman	C.E.	New York, N.Y.
James Heller	Bus.	Far Rockaway, N.Y.
Edward Barkdoll Hildum	M.E.	Plainfield, N.J.
George Austin Hottle	Ch.E.	Bethlehem
Carl Firman Hull	Bus.	East Orange, N.J.
George Martin Kaleda	E.E.	Mahanoy City
Theodore Robert Kellner	C.E.	Drexel
David Lewis MacAdam	Phys.	Upper Darby
Nathan Griffith Macadam	Arts	Catasauqua
Francis Maylum Morris	E.M.	Lansdale
Philip Benham Myers	Arts	Kingston
Joseph Napravnik	Ch.E.	Freemansburg

George Wellman Parsons	Arts	Philadelphia
Benjamin Rabinowitz	Ch.E.	Scranton
Robert Holland Raring	E.M.	Harrisburg
Maurice Binion Rosalsky	Arts	New York, N.Y.
Raymond Koch Serfass	I.E.	Pottsville
Elias Allie Sindel	Arts	Brooklyn, N.Y.
William Henry Spath	Arts	Hoboken, N.J.
William Chamberlain Warner	Arts	Montrose
Milton Gabriel Young	Phys.	Coopersburg

Prizes

WILBUR PRIZES, FRESHMAN YEAR

Mathematics, First Prize, \$15.00

Melvin Dresher Hackensack, N.J.

Mathematics, Second Prize, \$10.00

George Malcolm Dewees West Chester

English, \$15.00

John Williamson Langhaar Allentown

German, \$15.00

Elmer William Glick Bethlehem

French, \$15.00

David Davis Goldenberg New York, N.Y.

WILBUR PRIZES, SOPHOMORE YEAR

Mathematics, \$10.00

Roger Illick Fluck Bethlehem

English, \$10.00

William Chamberlain Warner Montrose

Physics, \$10.00

William Cronk Elmore Montour Falls, N.Y.

WILLIAMS FRESHMAN PRIZES IN ORAL COMPOSITION

First Prize, \$40.00

Matthew John Murphy Atlantic Highlands, N.J.

Second Prize, \$15.00

Edward Fleischer Bethlehem

WILLIAMS SOPHOMORE PRIZES IN ENGLISH COMPOSITION

First Prize, \$50.00

Maurice Binion Rosalsky New York, N.Y.

Second Prize, \$25.00

Edward Barkdoll Hildum Plainfield, N.J.

Third Prize, \$15.00

Samuel Kaplus Newark, N.J.

WILLIAMS JUNIOR PRIZES IN ENGLISH COMPOSITION

First Prize, \$40.00

Clyde Albert Harding Pen Argyl

Second Prize, \$15.00

Kenneth Karl Kost Gary, Ind.

ALUMNI PRIZES IN PUBLIC SPEAKING

First Prizes, \$25.00 each

Emanuel George Scoblionko Bethlehem

William Howard Shellenberger Bayonne, N.J.

Second Prizes, \$15.00 each

Everett Armstrong Fay

Robert Howard Swoyer

Cranford, N.J.

Hazleton

Third Prizes, \$10.00 each

Libert Theodore Chandler

John O'Neill, Jr.

Bethlehem

Tenafly, N.J.

MATHEMATICS PROBLEMS PRIZES

William Cronk Elmore

Robert Edgar Gohl

George Austin Hottle

Henry Louis Langhaar

David Lewis Mac Adam

Benjamin Rabinowitz

Montour Falls, N.Y.

Harrisburg

Bethlehem

Allentown

Upper Darby

Scranton

WILLIAM H. CHANDLER CHEMISTRY PRIZES

Freshman Year, \$25.00

Harvey Knight Allen

Bethlehem

Sophomore Year, \$25.00

William Kenneth Griesinger

Plainfield, N.J.

Junior Year, \$25.00

John Clewell Mertz

Allentown

METALLURGICAL ENGINEERING PRIZE

Sophomore Year, \$50.00

John Elmer Angle, Jr.

Mansfield, O.

ALUMNI JUNIOR PRIZES

Mechanical Engineering, \$25.00

Walton Forstall, Jr.

Rosemont

Metallurgical Engineering, \$25.00

Frank August Stutz

Washington, D.C.

WILBUR SCHOLARSHIP, \$200.00, for the best record among sophomores

William Cronk Elmore

Montour Falls, N.Y.

TAU BETA PI PRIZE (slide rule), for the best record among freshmen enrolled in engineering

James Crisman Rhoads

Harrisburg

ETA SIGMA PHI MEDAL, for the best record in sophomore collegiate Latin

Donald Wilson Haff

Northampton

PHI SIGMA KAPPA SCHOLARSHIP CUP (awarded for one year to the fraternity in the Interfraternity Council having the highest scholarship average for the preceding year)

Pi Lambda Phi

TRUSTEES' SCHOLARSHIP CUP (awarded for one year to the living group having the highest scholarship average for the preceding year)

Omega Phi Sigma

PI TAU SIGMA PRIZE, for the best record among freshmen enrolled in Mechanical Engineering

James Crisman Rhoades

Harrisburg

STUDENTS, 1930-1931

GRADUATE STUDENTS

<i>Name</i>	<i>Candidate for</i>	<i>Residence</i>
Address, Joseph Max, B.S. in E.E. (<i>Tufts College</i>)	M.S.	Cleburne, Tex. (Major: Electrical Eng.)
Beal, George Francis, B.S. in Ch.E. (<i>Iowa State College</i>)	M.S.	Omaha, Neb. (Major: Chemistry)
Beary, Joyce Elizabeth, B.A. (<i>Moravian College for Women</i>)	M.A.	Allentown (Major: History)
Bennetch, Leonard Muhlenberg, B.S. in Ch.E. (<i>Lehigh University</i>)	M.S.	Lebanon (Major: Chemistry)
Benton, Forest Theodore, Jr., Ch.E. (<i>Lehigh University</i>)	M.S.	Somerville, Mass. (Major: Chemistry)
Beverley, William, B.S. (<i>University of Florida</i>)		Big Stone Gap, Va.
Bollman, William Henry, A.B., B.D. (<i>Mission House College, Franklin</i> and <i>Marshall Seminary</i>)	M.A.	Bethlehem (Major: English)
Boone, Isabel Ardery, A.B. (<i>Drexel Institute</i>)		Bethlehem
Brand, Walter Johann, A.B. (<i>Western State College of Colorado</i>)	M.S.	Gunnison, Col. (Major: Chemistry)
Brooks, Paul James, B.S. in E.E. (<i>Ohio Northern University</i>)	M.S.	Allentown (Major: Electrical Eng.)
Bule, Bennett Frank, B.S. (<i>University of South Carolina</i>)	M.S.	Patrick, S.C. (Major: Geology)
Chesley, Kenneth Groves, A.B. (<i>University of Kansas</i>)	M.S.	Mineola, Kan. (Major: Chemistry)
Connelly, John Robert, B.S., M.S. (<i>University of Illinois</i>)		Danville, Ill.
Cook, Nevin John, B.A. (<i>Lehigh University</i>)	M.A.	Drums (Major: Education)
Cump, Guy, B.S. (<i>Gettysburg College</i>)	M.A.	Nazareth (Major: Education)
Davies, John Kenneth, B.S. (<i>Lafayette College</i>)	M.S.	Easton (Major: Psychology and Education)
DeGray, Richard John, Ch.E., M.S. (<i>Lehigh University</i>)		Bethlehem
Dodson, Adams, B.A., LL.B. (<i>Yale University, Harvard University</i>)	M.A.	Bethlehem (Major: History)
Erb, Albert Schmidt, B.S. (<i>Muhlenberg College</i>)	M.A.	Easton (Major: Education)

Ewing, Adah Shauver, B.S. (<i>Drake University</i>)	Grimes, Ia.
Ewing, Avarilla, B.A. (<i>Rice Institute</i>)	M.A. Dallas, Tex. (Major: Biology)
Formhals, William Harry, B.S. (<i>University of Illinois</i>)	M.S. Pittsburgh (Major: Electrical Eng.)
Fox, Bertha Sprague, B.A. (<i>Moravian College for Women</i>)	M.A. Bethlehem (Major: History)
Frantz, Alvin Jacob, B.S. in Chem. (<i>Lehigh University</i>)	M.S. Allentown (Major: Chemistry)
Fredrikson, Henning William, E.E. (<i>Chambers Polytechnical University</i>)	Allentown
Free, Lincoln Forrest, A.B. (<i>Lafayette College</i>)	M.S. Easton (Major: Mathematics)
Girvin, Christiana Edna, Ph.B. (<i>Muhlenberg College</i>)	M.A. Allentown (Major: History)
Goetz, Arthur William, Ch.E. (<i>University of Cincinnati</i>)	M.S. Cincinnati, O. (Major: Chemistry)
Gramley, Caroline Illick, A.B. (<i>Albright College</i>)	M.A. Bethlehem (Major: Latin)
Handwerk, Ira Paul, A.B. (<i>Lafayette College</i>)	M.A. Bethlehem (Major: Education and Psychology)
Hartman, Earl John, B.A. (<i>Bucknell University</i>)	M.A. Slatington (Major: History)
Heine, Lawrence Joseph, E.E. (<i>Lehigh University</i>)	M.S. Bethlehem (Major: Electrical Eng.)
Helms, Myrtle Laura, B.A. (<i>Moravian College for Women</i>)	Hellertown
Hermann, Selma Florine, B.S. in Chem. (<i>University of Cincinnati</i>)	M.S. Dayton, O. (Major: Metallurgy)
Hoback, Waller Howard, B.A. (<i>Roanoke College</i>)	M.S. Roanoke, Va. (Major: Chemistry)
Holme, Justus Mitchell, B.S. in C.E. (<i>University of Pennsylvania</i>)	M.S. Philadelphia (Major: Civil Eng.)
Holmes, Ernest George Nosworthy, Ph.B., S.T.B. (<i>Wesleyan University, Boston University</i>)	M.A. Bethlehem (Major: Philosophy)
Holtz, William Alfred, E.E. (<i>Ilmenau, Germany</i>)	Baden, Germany
Hoyler, Cyril Nathaniel, B.S. (<i>Moravian College</i>)	M.S. Green Bay, Wis. (Major: Physics)
Illick, Montford Elroy, B.S. (<i>Lafayette College</i>)	M.A. Hellertown (Major: History)
Jennings, Burgess Hill, B.Eng., M.S. (<i>Johns Hopkins University</i>)	Baltimore, Md.
Kern, David Alfred, A.B. (<i>Ursinus College</i>)	M.A. Slatington (Major: History)

- Kinnaman, P. Powers, B.S.
(*Bucknell University*)
- Kistler, Effie Mildred, A.B.
(*Cedar Crest College*)
- Knutson, Henry Carl Ivar, E.E.
(*Brooklyn Polytechnic Institute*)
- Kocher, Sterling Gladstone, B.S. in Ed.
(*Indiana State Teachers College*)
- Kratz, Philip, Ch.E.
(*Lehigh University*)
- Kreidler, Carl Lester, B.S. in C.E.
(*Lehigh University*)
- Kutz, Kathryn Mae, A.B.
(*University of Pennsylvania*)
- Laubach, Benjamin William, B.S.
(*Muhlenberg College*)
- Leitner, Frederick, B.A.
(*Lehigh University*)
- Lerch, Russell Otterbein, E.E.
(*Lehigh University*)
- Lesh, Stoddell Stokes, E.E.
(*Lehigh University*)
- Levering, John Albert, B.S. in Ch.E.
(*University of Pennsylvania*)
- MacDougall, Elizabeth, B.A.
(*University of Wisconsin*)
- McCarter, William S. Wright, B.S.
in Ch.E.
(*Pennsylvania State College*)
- Mease, Mabelle, Ph.B.
(*Muhlenberg College*)
- Midlam, Edward West, Jr., Ch.E.
(*Lehigh University*)
- Miller, William Schuyler, B.S. in Chem.
(*Lehigh University*)
- Mohr, Ella Bortz, Ph.B.
(*Muhlenberg College*)
- Mowrer, Robert Kready, B.S.
(*Franklin and Marshall College*)
- Myer, J. Leland, B.S. in Eng. Phys.
(*Lehigh University*)
- Merlinger, Dorothy, B.S.
(*University of Pennsylvania*)
- Nettles, Hill Reid, C.E.
(*University of South Carolina*)
- Newhard, Stella Elizabeth, Ph.B.
(*Muhlenberg College*)
- M.S. Easton
(Major: Electrical Eng.)
- M.A. Allentown
(Major: History)
- M.S. Bethlehem
(Major: Electrical Eng.)
- M.S. Bethlehem
(Major: Chemistry)
- M.S. Bethlehem
(Major: Civil Eng.)
- Bethlehem
- M.A. Catasauqua
(Major: Education)
- Bethlehem
- M.S. Palmyra
(Major: Electrical Eng.)
- M.S. Bethlehem
(Major: Electrical Eng.)
- M.S. Haddon Heights,
N.J.
(Major: Chemistry)
- M.A. Bethlehem
(Major: Bacteriology)
- M.S. Philadelphia
(Major: Chemistry)
- M.A. Allentown
(Major: History)
- M.S. Wilmington, Del.
(Major: Chemistry)
- M.S. Allentown
(Major: Chemistry)
- M.A. Allentown
(Major: History)
- M.S. Lancaster
(Major: Physics)
- M.S. Leola
(Major: Physics)
- Philadelphia
- M.S. Dillon, S.C.
(Major: Civil Eng.)
- M.A. Allentown
(Major: History)

- | | |
|---|---|
| Novak, George Peter, B.S.
(<i>Moravian College</i>) | M.A. Hellertown
(Major: History) |
| Olsson, Oscar Gerhard, E.E.
(<i>Chalmer's Institute of Technology</i>) | M.S. Allentown
(Major: Electrical Eng.) |
| Ortt, Elwood Leshner, A.B.
(<i>Muhlenberg College</i>) | M.A. Emaus
(Major: Education and Psychology) |
| Osteen, John Allen, B.S.
(<i>Furman University</i>) | M.S. Piedmont, S.C.
(Major: Physics) |
| Parkinson, Gordon Wesley, B.S. in
C.E.
(<i>University of Saskatchewan</i>) | M.S. Saskatoon,
Sask., Canada
(Major: Civil Eng.) |
| Payne, Elizabeth, B.A., M.A.
(<i>Wellesley College, University of Chicago</i>) | Bethlehem |
| Rekas, Karol, B.A.
(<i>Hochschule für Welthandel</i>) | M.A. Allentown
(Major: History) |
| Rheinneck, Alfred Edward, B.S. in
Ch.E.
(<i>University of Wisconsin</i>) | M.S. Milwaukee, Wis.
(Major: Chemistry) |
| Rogers, Alfred Nathan, B.S. in Ch.E.
(<i>Lehigh University</i>) | M.S. Reading
(Major: Chemistry) |
| Schaeffer, Austin M., B.S.
(<i>Franklin and Marshall College</i>) | M.A. Allentown
(Major: Psychology and Education) |
| Schier, Oscar Bernhardt, M.E.
(<i>Lehigh University</i>) | M.S. Ellicott City, Md.
(Major: Civil Eng.) |
| Schrope, Guy Sylvester, B.S.
(<i>Muhlenberg College</i>) | M.A. Allentown
(Major: Education) |
| Shields, Agnes Gertrude, B.A.
(<i>Moravian College for Women</i>) | M.A. Bethlehem
(Major: History) |
| Shugart, Lehman Charles, A.B.
(<i>Indiana University</i>) | M.S. Marion, Ind.
(Major: Physics) |
| Shumann, Alvin Arthur, Ch.E.
(<i>Rensselaer Polytechnic Institute</i>) | Easton |
| Smith, Arthur Levern, B.S. in Ch.E.
(<i>Lehigh University</i>) | M.S. Coatesville
(Major: Chemistry) |
| Sowers, Harry E., Ph.B.
(<i>Muhlenberg College</i>) | M.A. Pleasant Valley
(Major: Psychology) |
| Spillman, Ruth Miller, B.A.
(<i>Bryn Mawr College</i>) | M.S. Bethlehem
(Major: Bacteriology) |
| Springsteen, Mary Bicknell, A.B.
(<i>University of Michigan</i>) | Bethlehem |
| Steidle, William Jacob, B.A.
(<i>Lehigh University</i>) | M.A. Jamesburg, N.J.
(Major: Education) |
| Stover, James Riley, B.S. in E.E.
(<i>Pennsylvania State College</i>) | M.S. Shillington
(Major: Electrical Eng.) |
| Strelzoff, Joseph, E.E., M.E.
(<i>University of Liege</i>) | M.S. Allentown
(Major: Electrical Eng.) |
| Swain, Henry George, A.B.
(<i>Swarthmore College</i>) | M.A. East Orange, N.J.
(Major: Mathematics) |

- | | |
|---|--|
| Taylor, Robert Norman, Ph.B.
(<i>Muhlenberg College</i>) | M.A. Hellertown
(Major: Education) |
| Thierolf, Russell Lloyd, B.S.
(<i>Lafayette College</i>) | M.S. Bethlehem
(Major: Education and
Psychology) |
| Thom, George Boyd, M.E.
(<i>Lehigh University</i>) | M.S. Llanerch
(Major: Mechanical
Eng.) |
| Todd, Anna May, B.A.
(<i>Moravian College for Women</i>) | M.A. Bethlehem
(Major: Latin) |
| Traeger, Charles Henry, Jr., B.S. in
M.E.
(<i>Lehigh University</i>) | Rock Island, Ill.
(Major: Metallurgy) |
| Trembley, Francis John, B.S.
(<i>Hobart College</i>) | M.S. Naples, N.Y.
(Major: Biology) |
| von Heimburg, Fred Heino, E.E.
(<i>Columbia University</i>) | M.S. Allentown
(Major: Electrical Eng.) |
| Warner, Aaron S., B.S. in E.E.
(<i>Pennsylvania State College</i>) | M.S. Mohnton
(Major: Electrical Eng.) |
| Whitney, Forrest Jerome, Jr., B.S. in
E.E.
(<i>Lehigh University</i>) | M.S. Philadelphia
(Major: Metallurgy) |
| Willits, William Madeira, B.A.
(<i>Lafayette College</i>) | M.A. Reading
(Major: Education) |
| Wills, Walter Pennypacker, B.S. in
E.E.
(<i>Lehigh University</i>) | M.S. Elkins Park
(Major: Electrical Eng.) |

UNDERGRADUATE STUDENTS

Arts.—Arts and Science
 Bus.—Business Administration
 Ch.E.—Chemical Engineering
 Chem.—Chemistry
 C.E.—Civil Engineering
 E.E.—Electrical Engineering

E.M.—Mining Engineering
 Eng.—Freshman Engineering
 I.E.—Industrial Engineering
 M.E.—Mechanical Engineering
 Met.—Metallurgical Engineering
 Phys.—Engineering Physics

Abbe, Richard Taylor	Eng., '34	Kennett Square
Abbe, Robert	Bus., '34	Kennett Square
Abrahams, Moses	Arts, '33	Brooklyn, N.Y.
Abramsky, Irving Myron	Arts, '34	Poughkeepsie, N.Y.
Ackerman, Warren	Eng., '34	Schenectady, N.Y.
Adams, George Everett	Eng., '34	Ypsilanti, Mich.
Agocs, William Bailey	Eng., '34	Freemansburg
Akers, John Wesley	Bus., '34	South Sterling
Albert, Philip Ernest	Bus., '31	Trenton, N.J.
Alcorn, William Gaston	Arts, '31	Bethlehem
Alexander, Jay Lewis	Bus., '34	Pittston
Alleman, Gellert Spencer	Arts, '34	Wallingford
Allen, Arthur John	Eng., '34	Port Washington, N.Y.
Allen, Hamilton Fairfax	Bus., '32	Ft. Sam Houston, Tex.
Allen, Harvey Knight	Eng., '34	Bethlehem
Allison, Arthur James Brooks	Chem., '31	West Hartford, Conn.
Allison, Samuel Deane	Bus., '31	West Hartford, Conn.
Alper, Norman	Arts, '34	Providence, R.I.
Altland, Frederick Henry	E.E., '31	Abbottstown
Altman, Wilton	Arts, '32	Bethlehem
Ambruster, Watson, II	Eng., '34	Westfield, N.J.
Anamiasakis, Anthony Fotis	Bus., '33	Bethlehem
Anderson, Archibald MacGregor, Jr.	Arts, '32	Brooklyn, N.Y.
Anderson, Donald Herbert	Arts, '34	Pittsburgh
Anderson, James Evans	Arts, '33	Tottenville, N.Y.
Anderson, John Buchanan Robinson	Met., '31	Germantown
Anderson, Lloyd David	Eng., '34	Red Lion
Andrews, Harry, Jr.	Ch.E., '31	Walnutport
Andrews, John Greer	Bus., '34	Washington, D.C.
Andrews, Richard Allen	I.E., '33	Salt Lake City, Utah
Angle, John Elmer, Jr.	Met., '32	Mansfield, O.
Angle, Theodore Robison, Jr.	Bus., '34	Danville
Antoniotti, John James	C.E., '33	Union City, N.J.
Armat, Thomas, Jr.	Arts, '34	Washington, D.C.
Arnold, Edward Leopold, Jr.	Bus., '34	East Orange, N.J.
Aroniss, Isadore Robert	Bus., '34	Trenton, N.J.
Arthur, William Leighley	I.E., '33	Pittsburgh
Askin, Simon	Bus., '32	Mount Vernon, N.Y.

Aucott, William Connery	M.E., '33	Philadelphia
Aufhammer, John Alan	Bus., '34	Pittsburgh
Austin, Charles Augustus, II	Bus., '31	Elmira, N.Y.
Ayer, Fosdick Whitney	I.E., '33	Plainfield, N.J.
Ayers, Allan, Jr.	E.E., '32	Elizabeth, N.J.
Ayre, Thomas, Jr.	Bus., '31	Miner's Mills
Bachman, Robert Ruch	I.E., '33	Drexel Hill
Bachman, Walter Crawford	I.E., '33	Nazareth
Bahr, Paul Albert	E.E., '31	Scranton
Bailey, Albert Tanner, Jr.	Eng., '34	Montclair, N.J.
Bailey, Benjamin Cook	Eng., '34	Wallingford, Conn.
Bailey, George Hobart, Jr.	Bus., '34	Pittsburgh
Bailey, Oakford Chandler	I.E., '33	Pennsville, N.J.
Bailey, Samuel	Bus., '32	Glendale, O.
Baillie, John William	Eng., '34	Bethlehem
Baird, Robert Ligget, Jr.	E.M., '31	Lansdowne
Baker, Joseph Boyd	C.E., '33	Pittsburgh
Baker, William Perry	Bus., '33	New Rochelle, N.Y.
Baldwin, Armand Raphael	I.E., '32	Lansford
Bangsberg, Robert Ethan	E.E., '33	LaCrosse, Wis.
Banks, Carl Washington	E.E., '32	Pottsville
Barnard, Alfred Frank, Jr.	Met., '32	North Arlington, N.J.
Barnes, Allen Earl	Eng., '34	Philadelphia
Barney, Jerome	Eng., '34	Wilkes-Barre
Barrow, George Robert	Eng., '34	Enola
Barthold, Kenneth Woodrow	Arts, '33	Bethlehem
Basch, Bernard Isadore	Arts, '34	Scranton
Bassett, Morton Archer	Eng., '34	Kingston
Bauman, Maurice	Arts, '34	New York, N.Y.
Baur, Albert Clef	Ch.E., '31	Bethlehem
Bavington, Robert Francis	Bus., '34	Philadelphia
Baxendale, Francis William	Arts, '33	Flushing, N.Y.
Beach, Benjamin DeWitt	Eng., '34	Montrose
Beachler, Harold Roy	Bus., '31	Crafton
Beale, William Lippe	Eng., '34	Washington, D.C.
Beard, Wilfred George	E.E., '31	Oyster Bay, N.Y.
Beasley, Revere	Arts, '31	Glen Ridge, N.J.
Beaver, Donald Payne	Met., '32	Bethlehem
Beckel, Ralph Levering	Met., '33	Bethlehem
Beckwith, George Nicholas	Bus., '33	Pittsburgh
Beggs, Douglas Raiguel	Eng., '34	Reading
Behney, Paul Aaron	Phys., '32	Freeland
Beidler, John Kaufman	Eng., '34	Oakville
Bell, George Tillman, Jr.	Eng., '34	Washington, D.C.
Bell, James McKim, Jr.	C.E., '33	Rio de Janeiro, Brazil
Bell, John Wade, Jr.	I.E., '33	Quinwood, W.Va.
Belmore, Albert Joseph, Jr.	Arts, '32	Schuyler, Va.
Bene, Frank	Arts, '33	Bethlehem
Benedict, John Downey	I.E., '31	Waynesboro
Bennett, Charles Albert	Bus., '33	White Plains, N.Y.

Bennett, John Doane	Bus., '32	Worcester, Mass.
Bennett, Robert Granville	Eng., '34	Narberth
Bennett, William Ogle, Jr.	Phys., '32	Lancaster
Benson, Arthur Leonard	Phys., '33	Easton, Md.
Benson, Ralph Criswell	Arts, '32	Brooklyn, N.Y.
Berg, Leon	Arts, '31	Philadelphia
Berger, Francis Joseph	Bus., '34	Old Forge
Berger, Vincent Paul	M.E., '31	Aberdeen Proving Ground, Md.
Berkowitz, Sydney Bernard	Arts, '32	Brooklyn, N.Y.
Berlin, Aaron Samuel	Ch.E., '32	Wilmington, Del.
Bernstein, Gerald Alan	Arts, '32	New York, N.Y.
Bernstein, Maurice	Arts, '33	East Orange, N.J.
Best, Daniel Elwert	Met., '32	Stanhope, N.J.
Bewley, Frank Wilson	Eng., '34	Pottstown
Beyvl, Joseph Martin	C.E., '33	Cleveland, O.
Bienfang, George John	E.M., '32	Linden, N.J.
Billheimer, George Lee	Arts, '34	Harrisburg
Billman, Leroy Stanley	E.E., '31	Landisburg
Bilski, Peter John	Eng., '34	Jermyn
Bingham, Melville Comstock	Bus., '32	Rome, N.Y.
Bird, William Eric	Arts, '31	Birmingham, England
Biro, Frank	Arts, '33	Bethlehem
Bisbee, James McVey	E.E., '31	Susquehanna
Bishop, Ben Leon	Eng., '34	Manheim
Bishop, Charles Justus	Arts, '31	Scranton
Blood, John Edward	Arts, '31	Philadelphia
Bloom, John Alfred	Eng., '34	Lavalette, N.J.
Bloom, Kenneth Gordon	Bus., '34	Agawam, Mass.
Bloom, Louis Morris	Bus., '31	Philadelphia
Bloomer, Rundle Waite	Eng., '34	Brewster, N.Y.
Blum, Samuel	Bus., '32	Allentown
Blumberg, Eugene	Arts, '34	Wyomissing
Bogart, Maurice Stanley	Arts, '31	Patchogue, N.Y.
Bohning, William Harvey	Arts, '34	Bethlehem
Bollman, John Adam	Eng., '34	Lebanon
Bolton, Wilson W., Jr.	Bus., '34	York
Boltz, Jay Harold	E.E., '31	Lebanon
Bomberger, David Claude	Eng., '34	Reading
Bomhoff, Lewis Fred, Jr.	Bus., '31	Jackson, Mich.
Booker, Julian Harvey	Bus., '32	Wilmington, Del.
Boquel, Francis Peter	Bus., '33	Bethlehem
Borden, Kennard Fleming	M.E., '33	Collingswood, N.J.
Borton, Richard Alwyn	Eng., '34	South Orange, N.J.
Bosak, Joseph John	Eng., '34	Olyphant
Boughner, Jackson Leroy	Arts, '33	Manhattan, Kan.
Bounds, Ardrey Middleton	Met., '33	Philadelphia
Bowden, George Smith	Arts, '33	Nutley, N.J.
Boyd, James Daskin, Jr.	Arts, '31	Bayonne, N.J.
Boyd, Robert Putnam	E.M., '33	Staten Island, N.Y.

Boyer, Harry Jeremiah	Ch.E., '31	Egypt
Brace, Churchill Hewlett	Eng., '34	Elizabeth, N.J.
Bradin, John Percy, Jr.	Arts, '34	Elizabeth, N.J.
Brady, William Young, Jr.	Bus., '31	Washington, D.C.
Branda, Richard Randolph	E.M., '33	Hamilton, Ont., Canada
Brandner, John David	Ch.E., '32	Bethlehem
Braun, Robert Carl	Ch.E., '32	Reading
Bray, William Edwin	Arts, '33	Freeland
Brener, Daniel Augustus	Arts, '32	New York, N.Y.
Brennesholtz, Louis LeGrande	Bus., '32	East Orange, N.J.
Brettner, Louis Allen	Arts, '31	Allentown
Brewer, John Gilmore	Bus., '32	Pittsburgh
Breyley, William Byron, Jr.	Bus., '33	Buffalo, N.Y.
Briggs, Milton Alver	C.E., '31	Bradley Beach, N.J.
Brigham, Edmund Douglass	Bus., '33	Highland Park, Ill.
Britton, Horace Ely	Bus., '34	Kent, Conn.
Britton, Lawson Valentine, Jr.	M.E., '32	Scranton
Brodhead, Woodruff Martin	Eng., '34	Elizabeth, N.J.
Bronstein, Jesse Bayliss, Jr.	Arts, '31	Allentown
Brooks, Leonard	C.E., '32	Philadelphia
Brown, John Douglas	E.E., '32	Reading
Brumbach, George Edward	Met., '33	Esterly
Brunn, Herbert Theodore	Bus., '34	Brooklyn, N.Y.
Brydon, William Alfred	Arts, '34	Bloomington, Md.
Buchanan, William Christian	E.E., '33	Philadelphia
Buck, Richard Benn	Eng., '34	Williamstown, N.J.
Buck, Stuart Wylie, Jr.	Bus., '34	Rydal
Buckler, Edward St. Clair, Jr.	Met., '32	Baltimore, Md.
Bullard, Dexter	C.E., '31	Kew Gardens, N.Y.
Burcaw, Robert Albert	Eng., '34	Allentown
Burg, Robert Joseph	Bus., '34	Bethlehem
Burhouse, William Alfred	Ch.E., '33	Drexel Park
Burk, Russell Williams	Bus., '33	Newark, N.J.
Burke, Thomas William	Arts, '34	Allentown
Burns, Roy Herman	Bus., '32	Harrisburg
Burt, Charles Everett	Bus., '31	Hartford, Conn.
Busch, Herbert Hertgen	Bus., '31	Newark, N.J.
Byers, Lewis Cunningham	C.E., '33	Catonsville, Md.
Byers, Richard McCulloch	Eng., '34	Catonsville, Md.
Cabassa, Herman Forrest	C.E., '33	Atlantic City, N.J.
Cadmus, Richard Henry	Eng., '34	Pottstown
Camden, Graham Blackford	I.E., '31	Parkersburg, W.Va.
Campbell, Charles, Jr.	I.E., '33	Fullerton
Campbell, Charles, Jr.	Bus., '33	Pittsburgh
Campbell, James Bannon	Eng., '34	Pittsburgh
Campbell, James Crosby	Bus., '33	Flushing, N.Y.
Canfield, William Benjamin	Eng., '34	Caldwell, N.J.
Canning, Francis Joseph	Eng., '34	Cranford, N.J.
Canonico, Stephen	E.M., '33	Red Bank, N.J.

Canova, Remo	Eng., '34	Allentown
Canton, Lester	Arts, '31	New York, N.Y.
Carl, Howard Frederick	Eng., '34	Washington, D.C.
Carlile, Norman Alfred Henry	Eng., '34	Philadelphia
Carlin, Max	Arts, '31	Brooklyn, N.Y.
Carpenter, William Harry	Arts, '34	Upper Darby
Carr, Merton Crawford	Eng., '34	Buffalo, N.Y.
Carr, Robert Franklin	Met., '31	Monongahela
Carrillo, Andres, Jr.	Eng., '34	Havana, Cuba
Carwile, Nesbit LeGrand	Eng., '34	Washington, D.C.
Casselmann, Howard Frederick	I.E., '32	South Orange, N.J.
Cavin, Samuel Stewart	Eng., '34	Upper Darby
Chamberlin, Kenneth Irving	Bus., '34	Buffalo, N.Y.
Chambers, Charles Reed	Bus., '34	Audubon, N.J.
Chandler, Libert Theodore	M.E., '32	Bethlehem
Chanin, Marcy	Arts, '33	New York, N.Y.
Chapin, Henry Merritt	Ch.E., '33	Flushing, N.Y.
Chapman, Denman Scott	Eng., '34	Milwaukee, Wis.
Chappell, Stafford William, III	Eng., '34	Philadelphia
Charles, William Henry, Jr.	I.E., '33	Riverside, Ill.
Charlton, James Maxwell	Bus., '34	Scarsdale, N.Y.
Chase, Curtis Alden	E.E., '31	Danbury, Conn.
Chess, Robert Sterrett, Jr.	Bus., '31	Crafton
Christian, Edgar Arthur	C.E., '33	Philadelphia
Ciastkewicz, Arthur Joseph	E.M., '31	Hackettstown, N.J.
Ciulla, Thomas	Arts, '31	Brooklyn, N.Y.
Civardi, Arthur B.	Arts, '34	Bayside, N.Y.
Civardi, Walter Louis	Bus., '33	Bayside, N.Y.
Clark, Diar Ellsworth	Eng., '34	Deposit, N.Y.
Clark, Robert Curtis	I.E., '32	Pittsburgh
Clarke, Jess Fellows	Met., '33	Buffalo, N.Y.
Clarke, Joseph Murray	Eng., '34	Sparrows Point, Md.
Claus, Carl Oscar, Jr.	I.E., '31	Plainfield, N.J.
Clauss, Theodore	Bus., '33	Brooklyn, N.Y.
Claypoole, Richard Wilbur	I.E., '33	Freeport
Cleaveland, Charles Horace	Bus., '31	Bethlehem
Cleaver, Thomas Stevens	E.M., '32	Reading
Clegg, William James	Bus., '31	Pittsburgh
Clifford, Donald Berridge	Ch.E., '33	Manhasset, N.Y.
Cliver, Gordon Laurence	Eng., '34	Tottenville, N.Y.
Clocker, Edwin Thompson	Ch.E., '31	Bethlehem
Close, Courtney Taft	Eng., '34	Dunmore
Coe, Edwin Merritt	M.E., '33	Suffern, N.Y.
Coffin, Stanley Nelson	Bus., —	Bethlehem
Cohen, Saul Allen	Arts, '33	Lewistown
Cohn, Leslie McKinley	Arts, '31	New York, N.Y.
Cohn, Phineas William	Bus., '33	New York, N.Y.
Collins, Edgar Albert	Arts, '32	Scranton

Collins, Joseph Gerard	Arts,'32	Scranton
Collins, William Middleton	Arts,'32	Saranac Lake, N.Y.
Comins, Harrison Durgin	C.E., '33	Vineland, N.J.
Condit, Stephen Hobart	Bus., '31	Boonton, N.J.
Conti, Vincent	Arts,'34	Brooklyn, N.Y.
Coogan, Charles Halpin	Eng., '34	East Orange, N.J.
Cook, William Franklin	M.E., '33	Sylvan
Cooley, Charles Freeland	Eng., '34	Pennington, N.J.
Cooper, Charles William	E.E., '33	Sewickley
Cooper, George Ellsworth	Ch.E., '31	Coopersburg
Cooper, George Mullen	E.E., '31	Sewickley
Cooper, Malcolm Everett	I.E., '33	Paterson, N.J.
Cooper, William Herbert	Eng., '34	Drexel Hill
Copp, William Clifford	Bus., '34	Flushing, N.Y.
Cordaro, Joseph Angelo	Eng., '34	Freeland
Coroniti, Samuel Charles	Phys., '31	Marion Heights
Correll, Erwin Shvler	Bus., '33	Easton
Cottrell, Alfred	Eng., '34	Washington, D.C.
Cowenhoven, John	Eng., '34	East Orange, N.J.
Coxe, Charles Dickey	Met., '33	Uniontown
Coxe, Nelson Yeomans	Eng., '34	Uniontown
Crabtree, Elman Howard	Eng., '34	Cleveland Heights, O.
Crawford, Heber	Bus., '34	East Liverpool, O.
Cresswell, Ernest Jesse	I.E., '31	Scranton
Crichton, Andrew Beachly, Jr.	E.M., '33	Johnstown
Crichton, Clarendon Nelson	Arts,'33	Johnstown
Crispen, Hibberd Reese	E.M., '33	Harrisburg
Crocco, Samuel Robert	C.E., '32	Weedville
Crocker, Ernest Newcomb	Eng., '34	Germantown
Crompton, Robert Henry, Jr.	Eng., '34	Philadelphia
Cronin, John Howard	Bus., '33	Yorklyn, Del.
Crouse, William Burrill	Bus., '33	Philadelphia
Culbertson, Harlow Wheeler	Bus., '33	Sewickley
Culver, Donald Cooper	Eng., '34	Laurel, Del.
Cunningham, James Stuart, II	Bus., '34	Huntington, W.Va.
Current, Watson Edward	E.M., '32	Belleville, N.J.
Cushman, Hall Watson	I.E., '31	Bayside, N.Y.
Cyphers, Elmer Benjamin	Ch.E., '31	Bethlehem
Dailey, John Woodward	M.E., '31	Philadelphia
Dakin, Robert Calvin	Bus., '32	Scranton
Dalling, Robert Henry	Bus., '34	Stillwater, N.J.
Danser, Lowry Scattergood	Ch.E., '33	Yardley
Dantzer, Albert George	Eng., '34	Astoria, N.Y.
Datwyler, Howard Edward	C.E., '31	Flushing, N.Y.
Dautrich, Kenneth Harlan	Eng., '34	Reading
Davidson, Coolidge	I.E., '31	Montclair, N.J.
Davidson, Douglas Treat, Jr.	Arts,'32	Claymont, Del.
Davidson, Nachman	Arts,'31	Baltimore, Md.

Davis, Benjamin Miller	C.E., '31	Freeland
Davis, Daniel Richard	Eng., '34	Scranton
Davis, David Frost	Eng., '34	Farmingdale, N.Y.
Davis, Philip Smyser	E.M., '31	Lebanon
Davis, Robert Lincoln	I.E., '33	Norfolk, Va.
Davis, William Robert	Eng., '34	Lansford
Day, Gaylord Hill	Arts, '33	Perry Point, Md.
Dean, John Patterson	Arts, '32	Morristown, N.J.
Dean, Russell Tattershall	Ch.E., '33	Bethlehem
Dechnik, Andrew Dickens	Arts, '31	Bethlehem
Deckard, Ralph Herman	M.E., '31	Marysville
Decker, Harold Duane	Ch.E., '33	Kerhonkson, N.Y.
Decker, Lemoyne Eugene	Ch.E., '33	Harrisburg
Decker, Robert Edgar	Bus., '33	Douglaston, N.Y.
DeForeest, Edward Tucker	Eng., '34	Newark, N.J.
Deily, Richard Leo	Eng., '34	Scarsdale, N.Y.
Delano, Frank Elmer	Bus., '33	Bloomfield, N.J.
Demaree, John Samuel, III	Bus., '34	Allentown
Demarest, Harold Hunt	Bus., '34	Bloomfield, N.J.
deMeli, Henry Anthony	Eng., '34	New Brighton, N.Y.
Dempsey, Thomas Francis	Arts, '34	Bethlehem
Dengler, Robert Meyer	Eng., '34	Shenandoah
Denise, Charles Meirs, Jr.	Eng., '34	Oakmont
Derrico, Charles	Bus., '33	New York, N.Y.
DeTurk, Elder Pattison	Eng., '34	Reading
Detweiler, Thomas Francis	Eng., '34	Cape Charles, Va.
Deutschman, Manuel	M.E., '32	Easton
Deweese, George Malcolm	Ch.E., '33	West Chester
Dickerson, Julian Douglas	Met., '31	Washington, D.C.
Diefenbach, James Cummins	Bus., '33	Westfield, N.J.
Diener, Karl Miller	Bus., '34	Hamburg
Dietz, Harold LeRoy	Bus., '34	Harrisburg
Dinkel, Jack Creighton	Bus., '33	Buffalo, N.Y.
Doering, George Cooper	Arts, '32	Bryn Athyn
Donley, John Bland	Arts, '34	New York, N.Y.
Dorney, Donald Frederick	Eng., '34	Allentown
Dornin, George Armstrong, Jr.	Eng., '34	Baltimore, Md.
Dorworth, Charles Edwin	Bus., '32	Bellefonte
Doubleday, Thomas Patten	Bus., '34	Cooperstown, N.Y.
Douglas, Edward Braislin	Phys., '32	Plainfield, N.J.
Dow, James Neal	Ch.E., '31	Philadelphia
Dow, Langdon Cheves	Bus., '33	Trucksville
Drake, Donald James	Bus., '32	Buffalo, N.Y.
Drake, Herbert Ernest	I.E., '33	East Orange, N.J.
Dresher, Melvin	Phys., '33	Hackensack, N.J.
Dreyfus, Jack Jonas, Jr.	Arts, '34	Montgomery, Ala.
Drobek, Thaddeus William	Bus., '32	Reading
Druckerman, Bertram Abraham	Arts, '33	Brooklyn, N.Y.

Drukker, Raymond Henry	M.E., '31	Passaic, N.J.
Duke, Warren Valleau	Bus., '32	Ridgewood, N.J.
Duncan, Arno Lee Roy, Jr.	E.E., '32	Shillington
Duncan, James Edwin, III	Arts., '32	Washington
Eagan, John William, Jr.	Met., '33	Youngstown, O.
Earich, Robert Allen George	Eng., '34	Bethlehem
Earl, Robert Maxwell	Bus., '32	Harrisburg
Eastborn, William Robb	Eng., '34	Philadelphia
Easton, Elmer Charles	E.E., '31	Newark, N.J.
Easton, Ernest Doane	Eng., '34	Maplewood, N.J.
Ebert, David Mathias	Ch.E., '33	Wilmington, Del.
Eby, Martin Christian	Eng., '34	New Holland
Eckstein, David	Arts., '34	Trenton, N.J.
Eddleman, Edward Maurice	Arts., '34	Philadelphia
Eddleston, James Henry	Phys., '32	Easton
Edelstein, Monroe Manning	Arts., '31	Brooklyn, N.Y.
Eggleston, Richard Prosser	Eng., '34	Upper Darby
Ehlers, Henry Edward, Jr.	Bus., '34	Philadelphia
Ehrlich, Lester	Bus., '32	Brooklyn, N.Y.
Ehrsam, Theodore George, Jr.	Arts., '31	Tuckahoe, N.Y.
Eichelberger, Lewis Hay, Jr.	Eng., '34	Eagle Pass, Tex.
Eisenstadt, Gilbert Stanley	Arts., '34	Brooklyn, N.Y.
Eisenstaedt, Alfred	Bus., '31	New York, N.Y.
Eldred, Kenneth Eugene	Bus., '31	Bainbridge, N.Y.
Elkind, Martin	Arts., '34	Brooklyn, N.Y.
Elleni, Albert Umberto	Met., '33	West Pittston
Elliot, Henry Burns	M.E., '32	Lansdowne
Elliott, John Park	Eng., '34	Linwood
Ellison, Norman Charles	Bus., '32	South Orange, N.J.
Ellstrom, John Randolph	Ch.E., '33	Bethlehem
Elly, Robert Duncan	M.E., '32	Elizabeth, N.J.
Elmore, William Cronk	Phys., '32	Montour Falls, N.Y.
Ely, George Willis	Bus., '32	Holmdel, N.J.
Emery, Walter Earl	E.E., '31	Mount Bethel
Engel, Edwin Herman	Eng., '34	Hanne Muenden, Germany
Engel, John Augustine	Arts., '32	Stamford, Conn.
Engelman, Louis Jacobs	Bus., '33	Yonkers, N.Y.
Engelman, Robert Barnard	Bus., '31	Yonkers, N.Y.
Engle, William Oliver	C.E., '31	Scottdale
Engler, Kenneth Grantham	Bus., '34	South Orange, N.J.
English, Earl Rowland	Eng., '34	Cranford, N.J.
Enke, George Pryor, Jr.	I.E., '33	East Orange, N.J.
Enscoe, Robert Haydock	Bus., '32	Port Washington, N.Y.
Epstein, Avon Samuel	Arts., '34	Bethlehem
Ernststein, Harold	Bus., '32	Far Rockaway, N.Y.
Essenfeld, Jesse	Bus., '34	Brooklyn, N.Y.
Essick, Richard Jenkinson	Arts., '31	Reading
Ettelson, Albert Robert	Bus., '34	Philadelphia
Ettlinger, Daniel Solinger	Arts., '31	New York, N.Y.

Evans, Anderson Force	Arts,'31	Elizabeth, N.J.
Evans, David Daniel	Eng.,'34	Scranton
Evans, John Orville	Eng.,'34	Washington, D.C.
Evans, Paul Davies	Eng.,'34	Red Bank, N.J.
Everett, William Henry, Jr.	Bus.,'32	Bethlehem
Evers, Eben Francis	Bus.,'32	East Aurora, N.Y.
Eyster, Franklin Spangler	Bus.,'34	York
Eyster, William Myers, III	I.E.,'32	York
Fader, William Lewis, Jr.	I.E.,'33	Sewickley
Fairchild, Matthew Gilbert	I.E.,'32	Monterrey, N.L., Mexico
Faust, Delbert Grant	Eng.,'34	Philadelphia
Faust, Henry Joseph	I.E.,'31	Catasauqua
Fay, Everett Armstrong	Bus.,'31	Cranford, N.J.
Fay, Joseph Edmund	Eng.,'34	West Pittston
Feissner, Clinton Albert	Arts,'32	Eckley
Feit, Louis	Arts,'34	Woodbine, N.J.
Felton, Walter Wiest	E.E.,'33	Columbia
Fenner, Bayard Church, Jr.	Bus.,'33	South Orange, N.J.
Ferguson, Samuel Edward	Arts,'34	South Amboy, N.J.
Ferris, John Guy	Eng.,'34	Allentown
Ferry, John Jude	Eng.,'34	Bethlehem
Field, Joseph	Eng.,'34	Berwick
Filson, Maurice Alexander, Jr.	Bus.,'31	Easton
Firczak, Paul	Eng.,'34	McAdoo
Fischer, David Dave	Arts,'33	Long Branch, N.J.
Fisher, Frank Lynn	Arts,'32	Pottsville
Fisher, Harry Mueller	Eng.,'34	Drexel Hill
Fisher, Karl Albert	Ch.E.,'33	Kutztown
Fismer, William Lucius	Ch.E.,'33	Verona, N.J.
Fitzpatrick, James Francis, Jr.	Arts,'32	Bayside, N.Y.
Fitzpatrick, Ralph Norris	Chem.,'33	Bayside, N.Y.
Flanigan, Pierce John Lawrence, Jr.	C.E.,'33	Baltimore, Md.
Flaster, Joel Manuel	Arts,'31	Brooklyn, N.Y.
Fleischer, Edward	Arts,'33	Bethlehem
Fletcher, Theodore Francis	C.E.,'31	Philadelphia
Flisher, Leonard Hawkins	Arts,'34	Oakville, Conn.
Fluck, Roger Illick	C.E.,'32	Bethlehem
Folk, John Henry, Jr.	Bus.,'34	Brielle, N.J.
Folkner, Maurice Harvey	Eng.,'34	Buttville, N.J.
Folwell, John Davies	M.E.,'31	Allentown
Ford, Edward Flynn	Bus.,'34	Tulsa, Okla.
Ford, Hamilton Gates	Bus.,'34	Ridgewood, N.J.
Ford, Howard Holmes, Jr.	Bus.,'34	Ridgewood, N.J.
Ford, William Michaux	Bus.,'34	New Harmony, Ind.
Forshaw, John Hildreth	Eng.,'34	Scranton
Forstall, Walton, Jr.	M.E.,'31	Rosemont

Forsyth, Henry James	Met., '32	Buffalo, N.Y.
Fortman, Bernard Gerard, Jr.	Eng., '34	Pearl River, N.Y.
Foster, Kenneth Leroy	M.E., '33	Rockville Centre, N.Y.
Foulsham, Ernest George	Eng., '34	Bethlehem
Fountain, James Hopkins	Bus., '33	Easton, Md.
Frace, John William	Arts, '32	Easton
Frankenfield, Charles Walter	Eng., '34	Coopersburg
Frazee, Edward Blackwell	Eng., '34	West Deal, N.J.
Frederick, Charles Otto, Jr.	Arts, '31	Port Chester, N.Y.
Frederick, Ralph Horace	Ch.E., '33	East Greenville
Freed, Henry	Bus., '33	West Pittston
Freehafer, John Edwin	Phys., '31	Reading
Freese, Frank Bernard	Ch.E., '31	Lyndhurst, N.J.
Freiday, Donald Herbert	M.E., '33	East Orange, N.J.
Freiday, Horl Jay	M.E., '33	East Orange, N.J.
French, Frank John	Ch.E., '32	New Rochelle, N.Y.
French, George Thomas, Jr.	I.E., '32	Bloomfield, N.J.
French, Walter Clayton	M.E., '33	Philadelphia
Frick, Bernard LeRoy	Eng., '34	Lebanon
Frick, Charles Edward, Jr.	Eng., '34	Philadelphia
Friedberg, James Leonard	Arts, '34	Brooklyn, N.Y.
Friedel, Warren Wien	Eng., '34	Philadelphia
Friedman, Bernard Arnold	Arts, '32	Brooklyn, N.Y.
Friedman, Bertram Jacob	Bus., '31	New York, N.Y.
Friedman, Michael	Arts, '31	Newburgh, N.Y.
Friedman, Milton Jay	Arts, '33	Brooklyn, N.Y.
Friedrich, Ferdinand LaRue	Chem., '32	Hawthorne, N.J.
Fritts, James Anthony	Ch., E., '33	Phillipsburg, N.J.
Fritz, John Raymond	E.E., '33	Reading
Fritz, Samuel Frederick	I.E., '33	Reading
Fritz, William Charles	Chem., '32	Bethlehem
Frutiger, Thomas William	E.E., '33	Red Lion
Fry, Nelson Becker, Jr.	Eng., '34	Bala-Cynwyd
Fryling, Henry Heyward, Jr.	I.E., '32	Short Hills, N.J.
Fugard, John Reed	Eng., '34	Evanston, Ill.
Fuhrer, Walter	Ch.E., '32	Jersey City, N.J.
Fuller, Charles Arthur, Jr.	Arts, '34	Mount Vernon, N.Y.
Fuller, James Osborn	Arts, '34	Bethlehem
Fuller, Samuel Cassedy	Bus., '31	Pittsburgh
Fulweiler, John Herbert	Arts, '33	Wallingford
Furman, William Amies, Jr.	E.M., '31	Trenton, N.J.
Gabel, Martin	Arts, '33	Allentown
Gadd, Frank Willis	C.E., '32	Hartford, Conn.
Gadd, Robert Foster, Jr.	Arts., '32	Hartford, Conn.
Gaetjens, Herbert August	Bus., '32	Oradell, N.J.
Galanos, Miltiades Nicholas	Eng., '34	New York, N.Y.
Gallagher, Emanuel Joseph	Eng., '34	Allentown
Galvin, Walter Corlett	C.E., '31	Jamaica, N.Y.
Gamble, Robert William	Eng., '34	Allentown
Gamble, William John, Jr.	M.E., '33	Allentown

Garber, John Franklin	Ch.E., '33	Lumberville
Gardner, Kirkland Culter, Jr.		
B.A.	M.E., '32	Coraopolis
(<i>Williams College</i>)		
Garrett, Robert Heil	C.E., '33	Frackville
Gastin, Albert Anthony	Bus., '34	Shenandoah
Gearhart, Foster Lane	Eng., '34	Palmerton
Geary, Daniel Henry	Bus., '32	Springfield, Mass.
Geehr, Homer Pyle	Eng., '34	Wollaston, Mass.
Geiger, Franklin Ezra	Eng., '34	Hackensack, N.J.
Geller, Samuel Cortley	Bus., '34	Pittsfield, Mass.
Gemmel, Richard Harold	Eng., '34	Catasauqua
Gennet, Irving Eugene	Arts, '31	Newark, N.J.
Gerth, Harry John	Bus., '33	Rockville Centre, N.Y.
Gherst, Richard Hummel	M.E., '33	West Lawn
Gibbs, Wilbur Mercer	C.E., '33	White Haven
Giegerich, Carl Richard	Bus., '32	Bayside, N.Y.
Gilbert, Roswell Ward	C.E., '33	Brooklyn, N.Y.
Glace, Kenneth William	Ch.E., '31	Bethlehem
Gleason, John Haberman	Bus., '34	Duquesne
Glick, Elmer William	Arts, '33	Bethlehem
Gloss, Samuel Brandt	Eng., '34	Carlisle
Glover, John Michael	Ch.E., '31	St. Mary's
Gnecco, Harry Francis, Jr.	Eng., '34	Jersey City, N.J.
Goehring, William Henry, Jr.	Bus., '32	New Brighton
Gold, Arthur Jack	Bus., '33	Trenton, N.J.
Gold, Lester Charles	Arts, '33	Bethlehem
Goldberg, Abraham	Arts, '32	Bethlehem
Goldenberg, David Davis	Arts, '32	New York, N.Y.
Goldsbury, Grosvenor Hutchins		
	Bus., '34	Shields
Goldsmith, Emil Schott	Arts, '33	Bernardsville, N.J.
Goldstein, Meyer Robert	Arts, '32	Scranton
Goldstein, Morris	Bus., '34	New York, N.Y.
Goldstein, Mortimer	Bus., '34	Huntington, N.Y.
Good, Robert John	Bus., '33	Ephrata
Goodman, Samuel Ben	Bus., '32	Bethlehem
Goodman, Samuel Harry	Bus., '31	Bethlehem
Goodrich, George Edwards, Jr.		
	Eng., '34	Bedford
Gordon, Robert Ransom, Jr.	Bus., '34	Pittsburgh
Gorlin, Abraham Graham	Bus., '32	Jersey City, N.J.
Gormley, Edward Martin	M.E., '32	Hazleton
Gortner, John William	Eng., '34	Shamokin
Gosztonyi, John Charles	Bus., '34	Bethlehem
Gould, Henry Sanford	Arts, '34	Albany, N.Y.
Grafton, Herbert Sidney	Eng., '34	Trenton, N.J.
Graham, Arthur Lewis	Bus., '34	Buffalo, N.Y.
Graham, Edward Clark	Bus., '33	Newburgh, N.Y.
Graham, Merle James	Bus., '32	Pittsburgh

Graziani, Orlando	Ch.E., '33	Forli, Italy
Green, Charles Everard Joseph	Ch.E., '32	Duluth, Minn.
Green, William Jennings	M.E., '31	Baltimore, Md.
Gregg, Stephen Lincoln	E.E., '31	Washington, D.C.
Grier, Garrett Layton	Bus., '34	Milford, Del.
Griesinger, William Kenneth	Ch.E., '32	Plainfield, N.J.
Grimes, Howard Becker	C.E., '31	Womelsdorf
Grinevich, Joseph John	E.E., '32	Mahanoy City
Gross, John Ellsworth	Eng., '34	West Orange, N.J.
Grubbe, David James	Bus., '31	West New Brighton, N.Y.
Grudin, Abraham	Arts., '33	Hillside, N.J.
Gruhn, Henry Otto	Bus., '34	Brooklyn, N.Y.
Grusetz, David	Arts., '33	Brooklyn, N.Y.
Grzybowski, Leon Alfred	Arts., '34	Nanticoke
Guckes, William Lee	Eng., '34	Philadelphia
Guthrie, Edward Austin	Eng., '34	Madison, N.J.
Guyer, Evan Henry	E.E., '33	Buffalo, N.Y.
Haas, Manfred Jacques	Ch.E., '32	New York, N.Y.
Haas, William Augustus Sebastian	Eng., '34	Freeport, N.Y.
Haff, Donald Wilson	Arts., '32	Northampton
Hagstoz, George Swan	Ch.E., '33	Riverton, N.J.
Halbert, Allen Hyer	Bus., '32	Kew Gardens, N.Y.
Halbreich, Gerald Joel	Arts., '33	Brooklyn, N.Y.
Haldeman, John Henry	Bus., '31	Upper Darby
Hall, Harry Eugene, Jr.	Bus., '34	Moscow
Hall, John Edwin	Eng., '34	Bethlehem
Hall, Samuel Lindsay	Ch.E., '31	Hackensack, N.J.
Hall, William Briggs	Bus., '34	Troy, N.Y.
Halperin, Benjamin	Bus., '34	Pittsfield, Mass.
Halsted, Charles Freeman, Jr.	Bus., '33	Somerville, N.J.
Hamburger, Louis Benjamin Gerard	Bus., '31	Mount Vernon, N.Y.
Hamma, James Henry	Bus., '34	Camp Hill
Hammer, Fred Robert	Bus., '34	New Haven, Conn.
Hammond, Arthur LeRoy	Bus., '34	Brooklyn, N.Y.
Hammond, Blake Beverly	Arts., '33	Easton, Md.
Hamp, John Wilson	E.E., '31	Staunton, Va.
Hancock, John Buckley	Eng., '34	Bridgeport, Conn.
Hanna, Samuel James	Bus., '34	Swarthmore
Hans, Alexander Amede	C.E., '33	Locust Valley, N.Y.
Hansen, Christian Leonard	Arts., '32	Brooklyn, N.Y.
Harding, Clyde Albert	Arts., '31	Pen Argyl
Hargan, Frederick Dobson	C.E., '31	Bayonne, N.J.
Harleman, Samuel Thomas, Jr.	Bus., '33	Bethlehem
Harris, George Alexander	Bus., '32	Scranton
Harris, Robert Harris	E.E., '31	Narberth

Harris, William Thalheimer, Jr.	Bus., '34	Allentown
Harrison, Clifford Earl, Jr.	Ch.E., '33	Philadelphia
Harrison, John Sidney	Met., '31	Oakmont
Harrison, Nathan	Eng., '34	Reading
Harrower, Wilbur Parkhurst	Bus., '33	Plainfield, N.J.
Hart, John Henry, Jr.	Eng., '34	Bethlehem
Hart, William Winebiddle Phillips	Eng., '34	Bethlehem
Hartman, James Busse	M.E., '31	Allentown
Harton, Vincent Edward	I.E., '33	Derby, Conn.
Hasler, Herman, Jr.	Eng., '34	Caldwell, N.J.
Haupt, Harry Crickard, Jr.	Eng., '34	York
Haupt, Karl Faust	Eng., '34	Scranton
Hawkins, Thane Edwin	M.E., '31	Harrisburg
Hayman, Richard Homer	Eng., '34	Racine, O.
Haynes, Edward MacPherson, Jr.	Bus., '34	Skillman, N.J.
Hazen, John Mercer	Eng., '34	Bethlehem
Heether, Edward Paul	Arts, '32	Williamsport
Heether, Ernest Joseph	Eng., '34	Williamsport
Heffner, Joseph Hemig	Bus., '32	Wyomissing Hills
Heiney, John Weitzel	Eng., '34	Oxford
Heller, Edward Lincoln	Eng., '34	Palmerton
Heller, James	Bus., '31	Far Rockaway, N.Y.
Heller, Kenneth Jonas	Eng., '34	Allentown
Hemingway, Ellsworth Lowell	C.E., '33	Bridgeport, Conn.
Hemphill, Charles Williams	M.E., '31	Philadelphia
Hendricks, Marshall, Jr.	Eng., '34	Allentown
Henricks, Mark Willis	Eng., '34	Pottstown
Herb, Probert Edwards	Arts, '33	Luzerne
Herman, Jack Paul	Arts, '34	Newark, N.J.
Herman, William Emanuel	Bus., '32	York
Herrick, Robert Ford	Bus., '34	Youngstown, O.
Hertel, Charles Clement, Jr.	Eng., '34	Ridgewood, N.J.
Hertslet, Victor Beardsley	M.E., '33	Rowayton, Conn.
Hertzog, Jacob Franklin	M.E., '33	Mertztown
Hertzog, Rudolph Henry	Met., '33	Bethlehem
Hess, Adrien Leroy, B.S. (Missouri Valley College)	M.E., '32	Aullville, Mo.
Hess, Richard Samuel	Bus., '33	Bethlehem
Hess, Robert Graves	M.E., '31	Dallas
Hesse, Louis Osborne	Bus., '34	Roselle Park, N.J.
Hewitt, James Richard, Jr.	Met., '31	Baltimore, Md.
Hickman, William DeForest	E.E., '33	Arlington, N.J.
Hicks, Vernet Nelson	Eng., '34	Wharton, N.J.
Hildebrant, James Armstrong	Eng., '34	Dallas
Hildum, Edward Barkdoll	M.E., '32	Plainfield, N.J.
Hill, Harry Logan	Eng., '34	Baltimore, Md.
Himsworth, Winston Edge	I.E., '33	Flushing, N.Y.

Hindson, Theodore Phillip	Ch.E., '31	Freeland
Hinkle, Harold Eugene	Eng., '34	Bethlehem
Hinman, Kenneth Russell	I.E., '31	Plainfield, N.J.
Hires, Benjamin Franklyn	Bus., '32	Roadstown, N.J.
Hirsch, Leonard Coe	Bus., '34	White Plains, N.Y.
Hirshberg, Harold	Bus., '33	Forest Hills, N.Y.
Hirtle, Jerome Evan, Jr.	Eng., '34	Bath
Hoaster, Russell Eugene	Bus., '31	Lebanon
Hobbs, John Wallace	Eng., '34	Brooklyn, N.Y.
Hobson, Joseph Mansfield	Bus., '31	Philadelphia
Hochman, Nathan	Arts, '33	Brooklyn, N.Y.
Hodapp, Walter Leonard	Eng., '34	Maplewood, N.J.
Hoffman, Howard, Jr.	Eng., '34	Merwood Park
Holahan, John James	E.M., '32	Reading
Holler, Henry Greve	Bus., '34	Rockville Centre, N.Y.
Hollister, Charles Gurney	Eng., '34	Trenton, N.J.
Holme, Thomas Timings	Eng., '34	Philadelphia
Holmes, Lawrence John, Jr.	Eng., '34	Allentown
Holt, Reed Darlton	Bus., '34	Pittsburgh
Holtzman, Stephen Robert	Arts, '32	Hastings-on-Hudson, N.Y.
Holzshu, John Henry	Bus., '32	Cumberland, Md.
Homsher, Joseph Bert	I.E., '31	Strasburg
Honeyman, Kenneth Louis	Eng., '34	Somerville, N.J.
Honig, Emanuel Aaron	Arts, '31	Newark, N.J.
Hoover, Marcus Lacer	Eng., '34	Pottstown
Horn, Woodrow Washington	Bus., '34	Bangor
Horne, Arthur Welch	M.E., '32	Plainfield, N.J.
Horowitz, Munroe	Arts, '34	New York, N.Y.
Horst, William Aaron	Arts, '34	Hagerstown, Md.
Hottle, George Austin	Ch.E., '32	Bethlehem
Hough, John Beekman	Eng., '34	New York, N.Y.
Houston, James Homer	Bus., '32	West Grove
Howells, Edgar Harris	Eng., '34	Johnstown
Howells, George Benjamin	Eng., '34	Hanover
Hower, Edwin Neiman	Eng., '34	Lansdowne
Howitz, Charles Rawlings	Eng., '34	Chester
Hoyer, William Ellison	Arts, '31	Glen Ridge, N.J.
Hoyt, Alvord	Bus., '33	New Haven, Conn.
Hoyt, Harry Wibert	Bus., '33	Danbury, Conn.
Hoyt, Stuart MacNee	Bus., '33	Pennington, N.J.
Hughes, Joseph Graham	Eng., '34	Bellefonte
Hull, Carl Firman	Bus., '32	East Orange, N.J.
Hunoval, Joseph Andreas	Bus., '31	Irvington, N.J.
Hunt, George Edward	Bus., '31	East Orange, N.J.
Huntington, Levin Baker, Jr.	E.E., '33	Baltimore, Md.
Huntoon, Calvin Brewer	Bus., '31	Swarthmore
Hurwitz, Gordon	Arts, '34	Roxbury, Mass.
Hutt, Milton Howard	Eng., '34	Egg Harbor, N.J.
ImHof, Rudolf Emanuel	Arts, '32	Reading

Issel, William Ernest	M.E., '33	Philadelphia
Ivins, Daniel Foster, Jr.	Eng., '34	Trenton, N.J.
Jackel, William John	Met., '32	McKeesport
Jacks, Allan Maxfield	Eng., '34	Bloomfield, N.J.
Jackson, Charles Marcellus	Ch.E., '33	Philadelphia
Jackson, Walter William	Bus., '34	Ridgewood, N.J.
Jacobi, Walter Munhall	Bus., '34	Bayonne, N.J.
Jacobs, Albert Humphrey, Jr.	Bus., '33	Philadelphia
Jaggard, Henry Brill	Bus., '31	Berlin, N.J.
James, Paul Meyer	Eng., '34	Reading
James William Scott	Bus., '32	East Orange, N.J.
Jampol, Warren Sidney	Bus., '33	New Rochelle, N.Y.
Jaslow, Seymour Paul	Arts, '31	New York, N.Y.
Jasper, Richard Newton	Arts, '34	Mount Vernon, N.Y.
Jeanson, Charles August, III	Ch.E., '31	Brooklyn, N.Y.
Jeffries, Joseph, Jr.	E.E., '31	Hollis, N.Y.
Jenny, Ernest Frederick	Ch.E., '33	Dumont, N.J.
Jerauld, Herbert Aaron	Arts, '34	Attleboro, Mass.
Jester, George Comegys	I.E., '31	Delaware City, Del.
Job, Frederick Dwight	C.E., '31	Scranton
Johnson, Daniel Pierson	Bus., '31	Swarthmore
Johnson, Warren Stofflet	Bus., '33	Nazareth
Johnston, Drew Spamer	Arts, '34	Philadelphia
Jones, Frank Addison	E.M., '31	Washington, D.C.
Jones, Gordon Osborn	Bus., '33	Irvington, N.J.
Jones, Joseph William, Jr.	Eng., '34	Flint, Mich.
Jones, Robert Duggan	Ch.E., '31	Kingston
Jones, Vaughn Clinton	Eng., '34	Wind Gap
Jordan, Lester Earl	C.E., '31	Allentown
Jordan, Thomas Benjamin	Bus., '34	South Orange, N.J.
Judd, Pearson Morris	Arts, '31	Scranton
Jurden, Wilbur Lawrence	M.E., '32	Mount Vernon, N.Y.
Kadel, George Boyer	M.E., '31	Baltimore, Md.
Kahn, Milton Walter	Eng., '34	Stamford, Conn.
Kain, Royal Christopher	Eng., '34	Prince Bay, N.Y.
Kaleda, George Martin	E.E., '32	Mahanoy City
Kalisky, Leopold Mitchell	Arts, '34	Brooklyn, N.Y.
Kane, Louis	Bus., '34	Newton Center, Mass.
Kantner, Ogden Austin	E.M., '31	Cresskill, N.J.
Kaplan, Leon	Bus., '33	Scranton
Kaplan, Morris Elliot	Arts, '31	Hartford, Conn.
Kaplus, Samuel	Arts, '32	Newark, N.J.
Kates, Charles Reginald	C.E., '32	Cape May Court House, N.J.
Kaufman, Jack Henry	C.E., '33	Wilmette, Ill.
Kaufman, Oliver Horton	Bus., '34	Wilmette, Ill.
Kaufmann, Emerson Wertz	Ch.E., '32	Wyomissing
Kazunas, Paul Luke	Arts, '34	Shenandoah
Kearns, Francis James	Met., '33	Bridgeport, Conn.
Keck, Frederick Davidson	Bus., '33	Edgewood

Keefe, Leo Francis	Arts,'32	Rutland, Vt.
Kefauver, Noah Edward	Arts,'34	Middletown, Md.
Kehoe, John Edward	Met., '32	Bethlehem
Keller, Alfred William	Bus., '34	Summit, N.J.
Keller, George Henry	M.E., '33	York
Kelley, Richard Hollis	Eng., '34	Pottstown
Kelley, Walter Harvey, Jr.	Ch.E., '33	Bethlehem
Kellner, Theodore Robert	C.E., '32	Drexel Hill
Kellstedt, Charles Ward	M.E., '33	Flushing, N.Y.
Kelly, Harry Charles	Phys., '31	Wilkes-Barre
Kennedy, Earl Frederick	Eng., '34	New Bloomfield
Kennedy, Finlay Stewart	Eng., '34	Port Richmond, N.Y.
Kennedy, Frank Stewart	Eng., '34	Llanerch
Kerst, Orum Roehrer	Met., '33	Jersey City, N.J.
Kesser, Charles Wister	M.E., '33	Philadelphia
Kight, John Wesley	Eng., '34	New York, N.Y.
Kilpatrick, Howard Frederick	Bus., '34	South Orange, N.J.
Kimball, James Putnam	Arts,'34	Casper, Wyo.
Kime, Ansley Lewis	E.E., '31	Belleville, N.J.
King, Gilbert Westmore	Bus., '31	Glen Ridge, N.J.
Kinsinger, Walter Willis	E.E., '33	Harrisburg
Kirchman, Carl Edward	Bus., '34	Allentown
Kistler, Wilson Stephen	Bus., '34	Stroudsburg
Klatzkin, Charles	Bus., '34	Johnstown
Klein, Charles Anthony	Arts,'33	Allentown
Klein, Leonard	Arts,'32	Brooklyn, N.Y.
Klein, Wilson Goodwin	C.E., '31	Irvington, N.J.
Kleinman, Isaac Ernest	Arts,'34	Newark, N.J.
Kline, Forrest Lloyd	Eng., '34	Allentown
Klippert, Henry Laessle	Arts,'32	Mountain Home
Knecht, John Elmer	C.E., '31	Collingswood, N.J.
Knipe, Robert Krauss	M.E., '33	Philadelphia
Knipe, Vincent Arthur	Arts,'34	Bethlehem
Koch, Alfred Edward, Jr.	Eng., '34	Philadelphia
Koehler, Frank Joseph	Eng., '34	Lyndhurst, N.J.
Koehler, Paul Frederick	Arts,'33	Pleasantville, N.J.
Kolyer, Franklin Adea	Bus., '33	Summit, N.J.
Konolige, George Charles, Jr.	Bus., '34	Bethlehem
Koondel, Irving	Arts,'31	Brooklyn, N.Y.
Koondel, Jack William	Bus., '34	New York, N.Y.
Kopelov, David Solomon	Arts,'33	New York, N.Y.
Kopp, Paul Joseph	Ch.E., '33	Allentown
Korn, Willard Charles	Bus., '34	Irvington, N.J.
Kost, Kenneth Karl	Arts,'31	Gary, Ind.
Kostenbader, Walter Schmidt	Bus., '32	Nazareth
Kotanchik, Nicholas Walter	Eng., '34	Ranshaw
Krasner, Sanford	Bus., '34	Newark, N.J.
Kremer, Erich Conrad Gustav	Bus., '33	Paterson, N.J.
Kresge, Morris Tilghman	Eng., '34	Gilbert
Kresge, Warren Hillory	Eng., '34	Bethlehem

Kriebel, Henry August	C.E., '32	Allentown
Krone, Robert	Ch.E., '31	Hackensack, N.J.
Krott, Carl Harry Herbert	C.E., '31	Reading
Krusen, Henry Penn	Arts, '32	Yeadon
Kugler, Robert Green	C.E., '33	East Orange, N.J.
Kuklentz, Kenneth LeRoy	Ch.E., '32	Bethlehem
Kulp, Samuel Randall	Arts, '33	Bethlehem
Kuskin, Harry	Arts, '34	Newark, N.J.
Laftman, Richard Nicholas	Eng., '34	Bayonne, N.J.
Laird, Reed Gehret	Met., '31	Reading
Laird, William King	Eng., '34	Westfield, N.J.
Lamb, Elias Morton, Jr.	E.M., '31	Natalie
Lambert, Fred	Bus., '34	Maplewood, N.J.
Lanahan, Ellwood Royal	E.E., '33	Philadelphia
Lancit, Sidney Louis	Arts, '32	Newark, N.J.
Land, Sidney	E.E., '33	Brooklyn, N.Y.
Landis, Given Arnold	Eng., '34	Bethlehem
Landis, Robert Prince	Eng., '34	Sound Beach, Conn.
Landy, Samuel Henry	Bus., '31	Philadelphia
Lange, Clement Gustave	Eng., '34	Belmar, N.J.
Lange, George William	Arts, '34	Flushing, N.Y.
Langhaar, Henry Louis	M.E., '31	Allentown
Langhaar, John Williamson	I.E., '33	Allentown
Laporta, Xavier Vincent	Chem., '33	Weedville
Lark, Frederick Emanuel	Eng., '34	Shamokin
Larkin, Franklin Jonathan	Arts, '33	Bethlehem
Larsen, Arnold Leo	Bus., '34	South Orange, N.J.
Larson, Marshall Algott	Bus., '34	Jamestown, N.Y.
Laschober, Eugene William, Jr.	Met., '33	Belvidere, N.J.
Lathrop, William Romeyn	Bus., '33	Birmingham, Ala.
Latsha, Milton Paul	E.E., '31	Shamokin
Lawrence, Walter Welling	M.E., '32	Brooklyn, N.Y.
Laws, Harry Kline	Bus., '34	Philadelphia
Layton, Daniel John, Jr.	Arts, '33	Georgetown, Del.
Leach, John Frederick	I.E., '32	Reading
Leach, Orin Tuck	Bus., '34	Red Bank, N.J.
Learned, William Barton	Eng., '34	Pottsville
Lee, John Roscoe	Bus., '31	Kingston
Lee, Robert Peary	E.E., '33	Meriden, Conn.
Legge, Edwin Thomas	Met., '33	Bound Brook, N.J.
Lehr, Charles Frederick	Eng., '34	Stockertown
Lehr, Clarence	Arts, '31	Brooklyn, N.Y.
Lehr, Herbert	Bus., '34	Glendale, N.Y.
Leibowitt, Sol David	Arts, '33	Long Branch, N.J.
Leitzer, Julius Lawrence	Arts, '32	Brooklyn, N.Y.
Lengel, Robert Charles	Eng., '34	Bryn Mawr
Leraris, Dominic	E.M., '31	Bangor
Letowt, Alvin Bernard	Eng., '34	Hazleton
Levenson, Ben	Arts, '33	New York, N.Y.

Levenson, William Charles	Arts,'34	Newark, N.J.
Levi, Harold Benjamin	Arts,'32	Nanticoke
Levin, Lawrence William	Bus.,'34	Port Jervis, N.Y.
Levinson, Sidney David	Bus.,'33	Bradley Beach, N.J.
Levy, Herbert Irving	Arts,'33	New York, N.Y.
Levy, Jacob Joel	Arts,'32	Long Beach, N.Y.
Lewis, Frederick Stuart	Eng.,'34	Easton, Md.
Lewis, George	Arts,'33	Brooklyn, N.Y.
Lewis, Jerome Philip	Arts,'34	East Orange, N.J.
Lewis, Monroe Samuel	Arts,'33	Newark, N.J.
Lewis, Oliver Griffith	Eng.,'34	Indianapolis, Ind.
*Lewis, Philip Cornelius	Phys.,'31	Tenafly, N.J.
Lewis, Thomas Richard, Jr.	Bus.,'31	Jersey City, N.J.
Lewis, William Wing, Jr.	Bus.,'34	Buffalo, N.Y.
Lichtenstein, Sidney	Arts,'33	New York, N.Y.
Lieb, Harry	Bus.,'33	Newark, N.J.
Liggett, Frank Rahm, Jr.	Arts,'34	Pittsburgh
Lightner, Emery Roger	Bus.,'34	Irvine
Lincoln, Robert James	E.E.,'31	South Orange, N.J.
Lindabury, Richard Nicholas	Eng.,'34	Burlington, N.J.
Lindley, Fritz George	Arts,'34	New York, N.Y.
Linguitti, Albert Filbert	Bus.,'33	Brooklyn, N.Y.
Linn, Willis Frederick	Bus.,'32	Tremont
Lippard, Robert Frost	Eng.,'34	Buffalo, N.Y.
Lipscomb, Robert Crews	Eng.,'34	Low Moor, Va.
Lipsky, Alfred Joseph	Bus.,'33	Troy, N.Y.
Lipstein, Arthur	Arts,'32	Newark, N.J.
List, Alexander Frederick	Eng.,'34	Maplewood, N.J.
Litchfield, Milton Sherington	Arts,'33	Brooklyn, N.Y.
Little, James Stuart	Bus.,'32	Pelham Manor, N.Y.
Llop, Manuel Chesnel	Arts,'31	Ithaca, N.Y.
Lloyd, Elbert Stevens	Eng.,'34	Wilkes-Barre
Lloyd, John Armon	M.E.,'33	Wilkes-Barre
Lloyd, Milton Henry	Bus.,'34	Montclair, N.J.
Lloyd, Nicholas Peregrine, Jr.	M.E.,'33	Philadelphia
Lockhart, Hayden James	Bus.,'32	Parkersburg, W.Va.
Lodge, Richard Aspril	M.E.,'33	Philadelphia
Lohse, John Mueller	Phys.,'33	Glen Ridge, N.J.
Long, Austin Kunsman	Eng.,'34	Freemansburg
Long, Melvin LeRoy	M.E.,'32	Muncy
Lord, Carleton	M.E.,'32	Akron, O.
Lorson, Frank Edward, Jr.	Eng.,'34	New Rochelle, N.Y.
Loughran, Patrick Henry, Jr.	Eng.,'34	Washington, D.C.
Lowenstein, Charles Raymond	Arts,'31	Newark, N.J.
Lownie, William Alexander	Bus.,'32	Buffalo, N.Y.
Lubbers, Adolph William	Eng.,'34	Baltimore, Md.
Lubinski, William Richard	Arts,'34	Nanticoke
Lunger, Erwood Halsey	Eng.,'34	Morristown, N.J.
Lutzy, Robert Henry	Bus.,'33	Cleveland Heights, O.

* Deceased.

Lynch, Bradford Chynoweth	Eng., '34	Washington, D.C.
Lynch, Thomas Francis, Jr.	Eng., '34	Steelton
Lyons, John Martin, Jr.	Bus., '32	Princeton, N.J.
MacAdam, David Lewis	Phys., '32	Upper Darby
Macadam, Nathan Griffith	Arts, '32	Catasauqua
Macalady, Joseph William	Ch.E., '33	Shamokin
Macartney, John William, Jr.	Bus., '31	East Orange, N.J.
MacCleary, Robert Lee	Eng., '34	Pelham, N.Y.
MacDonald, Charles Grant	Eng., '34	Norwalk, Conn.
MacDonald, James Thomas, Jr.	Bus., '31	Brentwood Heights, Cal.
MacDougall, Douglas	Eng., '34	New York, N.Y.
MacDougall, Willis Clayton	Bus., '32	East Orange, N.J.
MacGillis, Donald John, Jr.	C.E., '31	Bethlehem
MacGuffie, James	Eng., '34	West Orange, N.J.
MacNeil, James Gordon	C.E., '33	New York, N.Y.
Magyar, John Joseph	Arts, '32	Bethlehem
Maharaj, James Earl	Bus., '32	Newburgh, N.Y.
Maier, Franz Joseph	M.E., '31	Royersford
Major, Alan Stratton	Bus., '34	Lehman
Makin, Thomas Robert	Eng., '34	Brooklyn, N.Y.
Malinowski, Francis Xavier	Eng., '34	Harrisburg
Malmros, Gustave Victor Alf	Phys., '31	Roslyn Heights, N.Y.
Manning, Streckfus William	Bus., '31	Bronxville, N.Y.
Marcovitz, Isadore Israel	Eng., '34	West Chester
Marino, Salvatore Charles	Arts, '31	New York, N.Y.
Marks, Charles Edwin, Jr.	Bus., '32	Yonkers, N.Y.
Marks, Robert Edwin	Eng., '34	Allentown
Marshall, Erwin Ellsworth, Jr.	Eng., '34	Trenton, N.J.
Martin, Harry Charles Coakley	Eng., '34	Glen Rock, N.J.
Martin, Lester Charles	Arts, '32	Elizabeth, N.J.
Marvel, Albert James	Eng., '34	Easton, Md.
Mason, William Daniel, Jr.	Arts, '33	Wallingford
Masters, Donald Smith	Eng., '34	Pittston
Matchett, Thomas Webster	M.E., '31	Passaic, N.J.
Matesky, Solomon Joseph	Eng., '34	Bethlehem
Mathers, John William	Eng., '34	Washington, D.C.
Mathews, George Eugene, Jr.	Ch.E., '33	Norwalk, Conn.
Mathison, George Shimer	E.E., '31	Philadelphia
May, Donald Henry	Ch.E., '32	Hazleton
Mayberry, William McCandless	Bus., '32	Philadelphia
Mayer, Hyman	Arts, '31	Brooklyn, N.Y.
Mayer, Jerome	Arts, '31	New York, N.Y.
Mayer, Victor	Arts, '34	Brooklyn, N.Y.
McArdle, John James	Bus., '34	Havana, Cuba
McBane, Alan Hubert	Eng., '34	Aliquippa
McBride, Charles Rhoades	Met., '32	Oakmont

McCandless, Andrew Fell	Bus., '34	Merion
McCarthy, Frank Joseph, Jr.	Bus., '31	Bethlehem
McCarty, Charles Allen	Eng., '34	Bethlehem
McClain, John Francis	M.E., '31	Lancaster
McCluskey, Frank P., Jr.	Bus., '34	Easton
McConahey, Hugh Milner	M.E., '33	Wilkinsburg
McConnell, Edward Clark	Arts, '31	Williamsport
McConnell, John Henry	Eng., '34	Youngstown, O.
McDaniel, Joseph Stites	Arts, '34	Dover, Del.
McDowell, Henry Woodward	Bus., '34	Maplewood, N.J.
McElroy, Alexander Thomas	C.E., '31	Corona, N.Y.
McElwain, John Stanley	Met., '33	Sewickley
McGarrity, William Fisher	Ch.E., '31	Youngstown, O.
McGinley, Edward Eugene	Eng., '34	Allentown
McGonigle, Duncan Hugh	Arts, '34	Portland, Ore.
McGovern, John Joseph	Ch.E., '33	Bethlehem
McHugh, Edward Joseph	Eng., '34	Philadelphia
McIlwraith, Arthur Kenneth	Bus., '34	Ridgewood, N.J.
McLean, Harry Laurance	Ch.E., '32	Scranton
McLeod, Richard Earl	Eng., '34	Rutherford, N.J.
McLernon, Joseph Francis	Arts., '32	Bethlehem
McMeans, George Beale	Eng., '34	Tarentum
McMullen, John Gates	Bus., '32	Maplewood, N.J.
McMullen, Roswell Stelle	Eng., '34	Carbondale
McNeill, Alfred Mason	Bus., '32	Philadelphia
Meekins, Walter A., Jr.	Bus., '34	Scranton
Meharg, John George	Arts, '31	Hamburg
Meissner, Milton	Eng., '34	Plainfield, N.J.
Meixell, Milo Daniel	Eng., '34	Nazareth
Mele, Sidney Charles	Arts, '32	Brooklyn, N.Y.
Memmert, John William	Eng., '34	Nazareth
Merriam, William Rush, II	Arts, '34	Washington, D.C.
Merritt, George Jester	Ch.E., '33	Wilmington, Del.
Mersheimer, Walter Lyons	Arts, '34	Jersey City, N.J.
Mertens, Fred Meharg	Eng., '34	Asbury Park, N.J.
Mertz, John Clewell	Ch.E., '31	Allentown
Mestre, Abel	Bus., '32	Santiago, Cuba
Metz, Elwood Cawley	Eng., '34	Nazareth
Metz, Ralph Ziegler	Bus., '34	Nazareth
Metzgar, Russell Eugene	E.M., '33	Nazareth
Metzgar, Malcolm Thomas	Arts, '31	Bethlehem
Meyer, Howard Everett	Eng., '34	Dumont, N.J.
Meyers, Edwin Truman	Ch.E., '32	Red Lion
Meyers, Harry Cyril, Jr.	Arts, '31	New York, N.Y.
Michael, John Francis	Eng., '34	Pottsville
Michaelson, Stanley Dey	Eng., '34	Brooklyn, N.Y.
Millelot, Leon Sylvester	Ch.E., '31	Lyndhurst, N.J.
Miller, Carl Andrew	E.M., '32	Rosebank, N.Y.
Miller, Clinton Fred	Eng., '34	Berwick
Miller, Donald Frantz	Eng., '34	Lancaster

Miller, Edward Julius	Bus., '34	Port Washington, N.Y.
Miller, Harold Yach	Eng., '34	Lyndhurst, N.J.
Miller, Harry	Arts., '31	Bethlehem
Miller, Henry Nathan	Arts., '33	Bethlehem
Miller, James Francis	E.E., '31	Tarentum
Miller, Jerold George	Arts., '32	Bethlehem
Miller, John Edwin	Bus., '33	Bethlehem
Miller, Lawson Hawkins	Bus., '32	Newburgh, N.Y.
Miller, Nathan	Arts., '32	Bethlehem
Miller, Seymour	Arts., '34	Brooklyn, N.Y.
Miller, Walter Samuel	Eng., '34	California
Miller, William Donald	C.E., '32	Scranton
Miller, William Francis	Eng., '34	Easton
Miller, Winton Lucius, Jr.	Bus., '32	Ridgewood, N.J.
Mills, William Wirt, Jr.	Bus., '33	Staten Island, N.Y.
Milson, Charles Alfred	Arts., '32	Catasauqua
Minife, Benjamin	Arts., '33	Belleville, N.J.
Minsker, John Henry	C.E., '31	East Aurora, N.Y.
Minskoff, Emanuel Ellington	Arts., '32	New York, N.Y.
Minskoff, Henry Harold	Arts., '34	New York, N.Y.
Mintz, Gerald Emanuel	E.E., '33	Allentown
Mitchell, George Henry, Jr.	I.E., '32	New York, N.Y.
Mitchell, Grable Harry	I.E., '33	Washington, D.C.
Moffett, Marvin Charles	Eng., '34	Coatesville
Moffett, Robert Nelson	Eng., '34	Coatesville
Mommers, Theodor Wallace	I.E., '32	Baltimore, Md.
Monness, Abbot Ross	Arts., '31	New York, N.Y.
Montenecourt, Jean Antoine	Met., '32	Cranford, N.J.
Montgomery, George Morton	Eng., '34	Philadelphia
Moomy, Richard Eugene		
Llewellyn	Bus., '33	Carlisle
Moore, Francis Raymond	Eng., '34	St. Clair, Mich.
Moorhead, Herman Alexander	Met., '33	Buffalo, N.Y.
Mor, Maurice Franklin	Bus., '32	Irvington, N.J.
Morgan, Charles Edmund, Jr.	Eng., '34	Sound Beach, Conn.
Morgan, Frank Benedict	Eng., '34	Dunmore
Morgan, Robert Vincent	Bus., '33	Bethlehem
Morgenbesser, Jerome Lester	Arts., '34	New York, N.Y.
Morhart, Frederick Henry, Jr.	Arts., '31	Washington, D.C.
Morris, Francis Maylum	E.M., '32	Lansdale
Morse, Edward Levyn	Bus., '33	Brooklyn, N.Y.
Morse, John Alfred	Eng., '34	Scranton
Moscowitz, Irving David	Bus., '32	New York, N.Y.
Motion, Robert	C.E., '31	Madison, N.J.
Mount, Wilbur Shepherd	M.E., '31	Princeton, N.J.
Mozes, Adolph	Eng., '34	Fullerton
Mueller, William Fred	Eng., '34	Jersey City, N.J.
Mungle, William	Eng., '34	Newark, N.J.
Munzer, Maurice Herbert	Arts., '33	New York, N.Y.
Murphey, Franklin Carpenter	Bus., '32	Athens, O.

Murphey, John Nichols	E.M., '32	Kerhonkson, N.Y.
Murphy, John Hankinson	Eng., '34	Tenafly, N.J.
Murphy, Matthew John	Arts, '33	Atlantic Highlands, N.J.
Murray, Francis Aloysius	C.E., '32	New Haven, Conn.
Myers, Benjamin Herman	Bus., '34	Salem, Mass.
Myers, Philip Benham	Arts, '32	Kingston
Myers, Robert Julius	Phys., '33	Elkins Park
Myra, Allen Esekeil	Ch.E., '31	Lunenburg, N.S., Canada
Nadler, Marriott Robert	Eng., '34	Trenton, N.J.
Napravnik, Joseph	Ch.E., '32	Freemansburg
Narzisi, Filadelfio	E.M., '32	Bethlehem
Nassau, Charles Francis, Jr.	Arts, '32	Philadelphia
Naugle, Harry Charles	Eng., '34	Ligonier
Nead, Benjamin Matthias, IV	Eng., '34	Harrisburg
Neel, Percy Landreth, Jr.	Bus., '33	Marion
Neely, John DeMont	Eng., '34	Latrobe
Nelson, Arnold Wilhelm	Met., '33	Westerleigh, N.Y.
Nelson, Arthur Ferdinand, Jr.	Eng., '34	Harrisburg
Nemetz, Carl Joseph	Bus., '31	Port Chester, Conn.
Nemzek, Francis Edwal	Eng., '34	Westfield, N.J.
Neudoerffer, Albert Lewis	Met., '33	Hatboro
Neuwirth, Francis	Arts, '31	Brooklyn, N.Y.
Newcomb, Thomas Warwick	C.E., '33	Long Branch, N.J.
Newhard, Henry Thomas	Ch.E., '32	Fullerton
Newman, Samuel Joseph	Bus., '33	Nutley, N.J.
Nichols, David Perry	I.E., '32	Pennington, N.J.
Nichols, John Perry	I.E., '33	Pennington, N.J.
Nickerson, Philip Gurney	Eng., '34	Pittsburgh
Nickowitz, Harry Samuel	Arts, '32	Newburgh, N.Y.
Niehaus, Raymond Martin	I.E., '33	East Orange, N.J.
Nisbet, George Porter	M.E., '31	Pittsburgh
Nisbet, Robert Alexander	I.E., '33	Pittsburgh
Nivin, David Traver	Eng., '34	Bethlehem
Noecker, Therman Clifford	Eng., '34	Shoemakersville
Noedel, Ernest Henry	E.E., '31	Reading
Nolfi, Emil Leo	Eng., '34	Glen Lyon
Nora, Thomas Edward	C.E., '33	New Brunswick, N.J.
Norman, Edward Alfred, Jr.	Eng., '34	West Englewood, N.J.
Norwood, Hayden Eugene	Arts, '32	Bethlehem
Oberstein, Melvin Bernard	Bus., '32	Allentown
Obert, Horace Dickinson	Arts, '31	Lehighton
O'Boyle, Charles Cobleigh	Eng., '34	New York, N.Y.
O'Brien, Harry Joseph, Jr.	Eng., '34	Deal, N.J.
O'Brien, Robert Lee, Jr.	Bus., '33	Washington, D.C.
Oest, William Theodore	Bus., '34	Jersey City, N.J.
Okuno, Clifford Kaiei	Eng., '34	Delaware Water Gap
Oldham, John Edwin	E.M., '32	Greenwich, Conn.
O'Leary, Frazier Lewis, Jr.	Bus., '31	Dorchester, Mass.

Olney, Richard Holden	Bus., '33	Lowell, Mass.
Olofson, Carl Theodore	Eng., '34	West Orange, N.J.
Olwine, Richard Eyrich	Eng., '34	Perth Amboy, N.J.
O'Neill, John, Jr.	Bus., '31	Tenafly, N.J.
Oppenheim, Auranus Miles	Bus., '31	South Orange, N.J.
Orban, Alexander John, Jr.	Arts, '34	Wharton, N.J.
Osborne, Daniel Cargill, Jr.	Arts, '32	Honesdale
Osborn, Harry Brooks, Jr.	Ch.E., '32	Newark, N.J.
Otto, Olaf, Jr.	Eng., '34	Savannah, Ga.
Ousey, Harry Haley	C.E., '31	Philadelphia
Pangburn, Robert Arthur	Eng., '34	Livingston Manor, N.Y.
Papa, Joseph Charles	Arts, '33	Philadelphia
Papp, Ernest	Eng., '34	Allentown
Parkhurst, Howard Oscar	Bus., '34	Orange, N.J.
Parsons, George Wellman	Arts, '31	Philadelphia
Partridge, Seymour Truman	Eng., '34	Northville, N.Y.
Paternoster, Joseph Albert, Jr.	Eng., '34	Trenton, N.J.
Paterson, Gordon Wilson	Bus., '34	Arlington, N.J.
Patterson, Earle, Jr.	I.E., '33	Swissvale
Patterson, John Alexander, Jr.	Ch.E., '31	Springfield
Peabody, Howard Waite	Bus., '33	Milford, Conn.
Pearre, Oliver Jackson	M.E., '31	Baltimore, Md.
Pease, Robert Horton	Bus., '34	Rochester, N.Y.
Peck, Clarence Bardwell, Jr.	Bus., '33	Charleston, W.Va.
Peck, Marcel Kahle	Bus., '34	Charleston, W.Va.
Pelizzoni, Alvin Remo	Arts, '34	Allentown
Pelizzoni, Winton John	Eng., '34	Allentown
Pentz, Harold Henry	Eng., '34	Bethlehem
Perlmutter, Herbert Merwin	Bus., '31	Newark, N.J.
Peters, Carl Brooks	Arts, '34	New York, N.Y.
Peterson, Walter Albert	Bus., '34	Summit N.J.
Petillo, John Anthony	Arts, '33	Red Bank, N.J.
Petty, Richard Servis	Bus., '34	New York, N.Y.
Pflaumer, Arthur Eugene	Ch.E., '33	Philadelphia
Pflaumer, George Monroe	Ch.E., '33	Philadelphia
Phillips, Robert Roth	Met., '33	Pittsburgh
Phillips, Robert Wilgus	Arts, '32	Bayonne, N.J.
Pickell, Clement	Eng., '34	Flushing, N.Y.
Pierce, Donald Charles	Bus., '33	Paterson, N.J.
Pierson, Benjamin Greene	Eng., '34	New York, N.Y.
Pimper, Charles William, Jr.	Ch.E., '32	Chevy Chase, Md.
Pisarev, David	Eng., '34	Bethlehem
Piscitelli, Emil James	Arts, '34	New York, N.Y.
Pitcairn, Alexander	Arts, '34	Pittsburgh
Platsky, Samuel Jacob	Bus., '32	Wilkes-Barre
Platt, Lucien Henry	Bus., '31	Saranac Lake, N.Y.
Plumb, Walter Timms	Bus., '34	Elizabeth, N.J.
Poggi, Edmund Howe, Jr.	I.E., '33	Wilkes-Barre

Pollacek, Wilson Clewell	Bus., '34	Matawan, N.J.
Port, William VanScoyoc	Arts, '31	Upper Darby
Porter, Robert Shelly	Eng., '34	East Northfield, Mass.
Posnak, Louis	Arts, '31	Bayonne, N.J.
Post, Alfred Philip, Jr.	Ch.E., '31	Philadelphia
Potter, William Townley	Bus., '33	Elizabeth, N.J.
Powers, Richard Mair	Bus., '31	Newton Centre, Mass.
Praznoski, John Felix	Eng., '34	Shenandoah
Price, Henry Embleton	Eng., '34	Sayre
Prior, Joseph Eli	Eng., '34	Bayonne, N.J.
Procopio, James Joseph	Eng., '34	Shamokin
Procter, Samuel Tilden, Jr.	Eng., '34	Nashville, Tenn.
Purdy, George William	Eng., '34	Englewood, N.J.
Quinn, Joseph Aloysius	Eng., '34	Pittston
Rabinowitz, Benjamin	Ch.E., '32	Scranton
Raccuglia, Phillip Peter	Arts, '34	Brooklyn, N.Y.
Radding, Jason David	Bus., '34	Larchmont, N.Y.
Rader, Milton James	Eng., '34	Easton
Randall, Edward John	Bus., '34	Huntingdon
Rankin, Clinton Draper	Bus., '31	Stratford, Conn.
Ransburg, Walter Townsend	Arts, '33	New York, N.Y.
Rappeport, Leon Irving	Arts, '33	Bloomfield, N.J.
Raring, Linus Michael	Eng., '34	Harrisburg
Raring, Robert Holland	E.M., '32	Harrisburg
Rather, James Burness, Jr.	Ch.E., '32	Brooklyn, N.Y.
Rauch, Philip	Bus., '33	Brooklyn, N.Y.
Rawn, Andrew Bryson, Jr.	I.E., '33	Huntington, W.Va.
Reabuck, Roy Arthur	Arts, '34	Forty Fort
Reed, George Douglas	I.E., '33	Baltimore, Md.
Reed, Martin Monroe, Jr.	Arts, '33	Philadelphia
Regar, Philip Waters	E.E., '33	Collegeville
Renkin, William Steward	Eng., '34	Oradell, N.J.
Repa, George John	Arts, '33	Kingston
Replogle, Charles Nathan, Jr.	Eng., '34	Johnstown
Restenberger, Thomas Birkbeck	Arts, '34	Allentown
Retzer, William Raymond	Eng., '34	Deposit, N.Y.
Reynolds, Peter Graham	M.E., '32	Bethlehem
Reynolds, Thomas Bernard	Eng., '34	Phillipsburg, N.J.
Rhoades, William Taylor	Bus., '33	West Point, N.Y.
Rhoads, James Crisman	M.E., '33	Harrisburg
Ricards, Atwood Jester	Ch.E., '33	Marshallton, Del.
Richardson, Lincoln Thomas	Bus., '31	Demarest, N.J.
Richter, Frederick Kingdon	Eng., '34	Selinsgrove
Ridge, William Francis, Jr.	Eng., '34	Tamaqua
Riedy, Ethelbert Augustus		
Richard	Ch.E., '33	Allentown
Rights, Fred Lewis	Ch.E., '33	Bethlehem
Rigling, Vance Fager	E.E., '33	New Cumberland
Riley, George Hempstead	Bus., '32	Hagerstown, Md.

Riley, Robert Leinbach	Eng., '34	Woodcliff, N.J.
Rinker, Kenneth Keiser	M.E., '32	Catasauqua
Rishell, William John	Eng., '34	Nanticoke
Ritter, Ernest Frederick, Jr.	Arts., '34	Allentown
Ritter, Stewart Elwood, Jr.	Bus., '31	Allentown
Riviere, Burt Henry	Bus., '33	Pittsburgh
Robar, Henry John	Met., '33	Bethlehem
Robb, Alexander Duffield, Jr.	Bus., '33	Grand Island, N.Y.
Robb, Edward Haupt	Bus., '33	Grand Island, N.Y.
Robbins, Leonard Edmund	Arts., '34	Millville, N.J.
Roberts, Frank Stuart	Eng., '34	Wilkes-Barre
Roberts, Harold C.	E.M., '31	Carthage, N.Y.
Robinson, Richard Rogers	Arts., '31	Trenton, N.J.
Robson, Charles Howard	C.E., '33	Lansdowne
Rochester, James Fountain	Bus., '34	Philadelphia
Rochlin, Julian	Arts., '34	Stamford, Conn.
Rock, John Hampton	Eng., '34	Fairmont, W.Va.
Roebor, William Henry	Bus., '33	Irvington, N.J.
Roeder, John Seymour	Bus., '33	Richmond Hill, N.Y.
Roessle, James Jackson	Arts., '33	Pittsburgh
Rogers, Paul Wellington	Eng., '34	Asbury Park, N.J.
Rohrer, Frederick Findlay, Jr.	Eng., '34	Wilkinsburg
Rohrs, Arthur George	I.E., '32	Ridgewood, N.J.
Roll, Richard Gustave	Arts., '33	East Orange, N.J.
Roper, John Nathaniel, Jr.	Eng., '34	Petersburg, Va.
Rorty, Philip Adams	Bus., '33	Goshen, N.Y.
Rosalsky, Maurice Binion	Arts., '32	New York, N.Y.
Rose, Arnold Levy	Bus., '33	New York, N.Y.
Rosencrans, Charles Arthur	E.E., '31	Warwick, N.Y.
Rosenheim, Morton Adolf	Arts., '34	Brooklyn, N.Y.
Rosenwasser, Sidney Robert	Arts., '33	New York, N.Y.
Ross, Edwin Morrison	Ch.E., '32	Philadelphia
Ross, Lawrence Campbell	Bus., '34	Loch Arbour, N.J.
Roth, Charles Samuel	Eng., '34	Allentown
Roth, William Oscar	Bus., '32	New Rochelle, N.Y.
Rothenberg, Joel Elmer	Arts., '32	Brooklyn, N.Y.
Rothenberg, Nathaniel Shomer	Arts., '34	New York, N.Y.
Rowland, Lindsay	Arts., '34	Freeland
Roy, Robert Merton	Eng., '34	Sussex, N.J.
Rozelle, Arlington Laverne	E.E., '32	Carbondale
Rubin, William	Bus., '33	New York, N.Y.
Ruch, Richard Karl	Chem., '33	Allentown
Ruderman, Manuel Leon	Arts., '33	Somerville, N.J.
Rueda, Jorge Gustavo	Eng., '34	Mamaroneck, N.Y.
Ruffer, Harry Herman	Bus., '33	Westfield, N.J.
Ruggles, Harry Wyndham, Jr.	Arts., '32	Kingston
Ruhf, Richard Charles	Eng., '34	Allentown
Rupley, William Ramsburg, Jr.	Bus., '33	Grand Rapids, Mich.

Rushong, Frank Anders	Met., '31	Collegeville
Russo, Rudolph Louis	Arts., '34	Brooklyn, N.Y.
Rust, George Mooar	M.E., '31	Birmingham, Ala.
Rust, Stirling Murray, Jr.	Eng., '34	Pittsburgh
Ruth, George Clifford	Bus., '34	Maplewood, N.J.
Ryan, James Kenneth	Bus., '33	Schenectady, N.Y.
Sachs, William Howard	Arts., '33	Binghamton, N.Y.
Sadtler, Philip	Eng., '34	Philadelphia
Saffer, Sidney Hugh	Arts., '32	Brooklyn, N.Y.
Sagendorph, Thomas Mirkel	Bus., '34	Philadelphia
Sahm, Henry Spencer	Bus., '32	Scranton
Salazar, Luis Alberto C.	Eng., '34	San Jose, Costa Rica
Saler, Harold Benjamin	Arts., '31	Philadelphia
Salkin, Robert Edward	Arts., '34	New Rochelle, N.Y.
Salwen, Robert	Arts., '32	Brooklyn, N.Y.
Salz, Jacque Ashley	Arts., '34	New York, N.Y.
Samuels, Bernard Edwin	Arts., '31	Brooklyn, N.Y.
Sandercock, Charles Hulbert	Eng., '34	Scranton
Sanna, Alfred Anthony	Bus., '31	Pen Argyl
Satz, Leonard	Arts., '34	Lawrence, N.Y.
Savage, Rufus Llewellyn, Jr.	Ch.E., '31	Asbury Park, N.J.
Savastio, Edward Henry	C.E., '31	Philadelphia
Sawyer, Donald Stanley	Arts., '32	Bethlehem
Sawyer, John Sherman	C.E., '33	Bethlehem
Saxman, Peter Marseilles, Jr.	Arts., '34	Somerset
Saxtan, Burton Webster	Bus., '32	Jersey City, N.J.
Schacht, Edward Lawrence	Bus., '32	Flushing, N.Y.
Schaffer, Elwood Joseph	Eng., '34	Bath
Schaffer, Irving	Arts., '31	Brooklyn, N.Y.
Schal, George Richardson	Bus., '34	Oradell, N.J.
Schankman, Benjamin Maxwell	Arts., '34	Long Beach, NY.
Scharfenberg, Chatwin Ambrose	M.E., '33	East Rockaway, N.Y.
Schaub, Charles Emmet	Eng., '34	Freeland
Schaub, Howard Warren	E.E., '31	Freeland
Schaumburg, George John	C.E., '31	Reading
Scheer, Henry Conrad, Jr.	I.E., '33	Glen Ridge, N.J.
Schenck, Mead, Jr.	Arts., '33	Pittston
Schier, Carl Frederick, Jr.	M.E., '32	Ellicott City, Md.
Schilling, Frank David	Arts., '34	Philadelphia
Schilling, Murray Courtwright	Bus., '32	Clarks Summit
Schleimer, Irving George	Arts., '34	Brooklyn, N.Y.
Schmidt, Charles Mackenzie	Eng., '34	Farmingdale, N.Y.
Schneck, Karl Roy	Arts., '33	Allentown
Schneider, Harvey Louis	Bus., '34	Rockville Centre, N.Y.
Schneider, John Wesley	Phys., '32	Lancaster
Scholl, Harold Nevin	Eng., '34	Earlington
Scholla, Paul Frederick	Eng., '34	Dunmore
Schooley, David Nixon	Bus., '34	Trucksville

Schreiber, Raymond Hess	Bus., '34	Carnegie
Schroeder, Jacob Weiskircher	Met., '31	McKeesport
Schuck, William Mitchell	C.E., '32	Philadelphia
Schuyler, Elmer VanNess	I.E., '33	Upper Darby
Schwartz, Arthur	Phys., '33	Allentown
Schwartz, John Francis	C.E., '32	Allentown
Schwartz, Sanford	Arts, '33	New York, N.Y.
Schwenk, Walter Louis, Jr.	Ch.E., '32	Allentown
Scoblionko, Emanuel George	Arts, '31	Bethlehem
Scotfield, Francis Collins	Chem., '31	Lanham, Md.
Seabrook, Charles Courtney	C.E., '32	Bridgeton, N.J.
Seal, Paul Wesley	E.E., '31	Factoryville
Seeburger, William	E.M., '32	Philadelphia
Seiden, Leon	Bus., '31	Lakewood, N.J.
Seiler, Edwin William	Eng., '34	Maplewood, N.J.
Selby, Jerome Patrick	Eng., '34	Batlimore, Md.
Serfass, Earl James	Ch.E., '33	Allentown
Serfass, Raymond Koch	I.E., '32	Pottsville
Sergott, Edmund Thaddeus	Bus., '33	Glen Lyon
Shafer, David Woodrow	Eng., '34	Bethlehem
Shaheen, Henry John	Bus., '34	Elberon, N.J.
Shanker, Meyer William	Arts, '32	Brooklyn, N.Y.
Shankweiler, Ray Gernert	E.E., '32	Allentown
Shannon, Francis Patrick, B.S.	M.E., '31	Buffalo, N.Y.
<i>(Canisius College)</i>		
Shaw, Franklin Bolton	C.E., '32	Swedesboro, N.J.
Shay, Felix Buckley	E.M., '31	East Aurora, N.Y.
Sheen, Robert Tilton	Ch.E., '31	Philadelphia
Shelhart, John William	I.E., '33	Cleveland, O.
Shellenberger, William Howard	C.E., '32	Bayonne, N.J.
Shimer, Acton Jerome	Eng., '34	Bethlehem
Shimer, Stewart Applegate, Jr.	Arts, '32	Bethlehem
Shipley, David Gregg	Arts, '33	Hoboken, N.J.
Shipley, Samuel Richards	Arts, '31	Philadelphia
Shipp, Harry Benedict	Eng., '34	Bethlehem
Shoemaker, Comly James	Eng., '34	Pottstown
Shoemaker, Francis	Arts, '31	Norristown
Shoemaker, George Richard	C.E., '31	Pottstown
Short, Paul Edward	Bus., '34	Belleville, N.J.
Shultis, Harry Vactor, Jr.	Eng., '34	Bogota, N.J.
Sickles, John Orrin	Eng., '34	Oceanport, N.J.
Siebert, Carl Frederick	Eng., '34	Coopersburg
Siegrist, Roy Buckwalter	M.E., '31	Lancaster
Sierocki, Alfons	Arts, '34	Nanticoke
Sievering, Howard	E.E., '32	Maplewood, N.J.
Sights, Preston Bevel	Eng., '34	Memphis, Tenn.
Silimperi, Pasquale	Eng., '34	Bethlehem
Silowitz, Irving	Arts, '34	Brooklyn, N.Y.

Silver, Harold Irving	Bus., '34	Hudson, N.Y.
Silverstein, Harold	Arts, '34	Philadelphia
Silverstein, Milton	Bus., '33	Brooklyn, N.Y.
Simcoe, William Henry	C.E., '33	Trenton, N. J.
Simes, Rowland James, Jr.	I.E., '32	Brooklyn, N.Y.
Simmons, Samuel John, Jr.	Bus., '33	New York, N.Y.
Simon, Stanley Emanuel	M.E., '32	Seaford, Del.
Simpson, William Carl	Met., '33	Columbia, N.J.
Sims, Ivor Donald	Bus., '33	Bethlehem
Sinclair, Alonzo Loraine	Ch.E., '32	Norristown
Sincock, Harold Edwin	Ch.E., '31	Sparrows Point, Md.
Sindel, Elias Allie	Arts, '31	Brooklyn, N.Y.
Sittler, Paul Mertz	Eng., '34	Kutztown
Skelly, John Scott, Jr.	Eng., '34	Monongahela
Slade, Benjamin	Arts, '33	Newark, N.J.
Slaughter, Page Harrison, Jr.	Bus., '33	East Aurora, N.Y.
Slichter, Charles Byron	Ch.E., '32	Reading
Slingerland, Edward Gilman	Bus., '34	Millburn, N.J.
Smith, Donald	Bus., '34	Milford, Del.
Smith, Elmer Francis, Jr.	Eng., '34	Roselle Park, N.J.
Smith, Francis Gerecke	Ch.E., '32	Newburgh, N.Y.
Smith, Francis John	Arts, '34	Ballston Spa, N.Y.
Smith, George Reeve	Bus., '34	Mineola, N.Y.
Smith, Gerard Leonard	Eng., '34	Scranton
Smith, Irwin Curtiss	Eng., '34	Mineola, N.Y.
Smith, Robert Clifford, Jr.	Ch.E., '31	Shawnee
Snavely, Frank Lichty	I.E., '33	Lancaster
Snitkin, Sydney Raymond	Arts, '31	New York, N.Y.
Snyder, Ralph Ray, Jr.	Eng., '34	Harrisburg
Snyder, Raymond Eugene	E.E., '31	Lemoyne
Snyder, Richard Lee, Jr.	E.E., '33	Glassboro, N.J.
Sobel, Abraham Wilson	Arts, '32	Brooklyn, N.Y.
Sobo, Cecil	Arts, '32	Newark, N.J.
Sobo, Leslie Milford	Arts., '31	Newark, N.J.
Soffel, Eugene Milton	Eng., '34	Canton, O.
Sofman, Arthur	Bus., '32	Newark, N.J.
Solomon, Samuel	Arts, '32	Brooklyn, N.Y.
Somers, William Eugene	M.E., '33	Youngstown, O.
Sommer, Felix Marcus	Bus., '33	Newark, N.J.
Sones, William Lloyd	Phys., '32	Pottsville
Sordon, Edward Preston	E.E., '31	Riverton, N.J.
Sosna, Rudolph Joseph	Bus., '34	Philadelphia
Spath, William Henry	Arts, '32	Hoboken, N.J.
Spector, Morton David	Bus., '33	Philadelphia
Spector, Sydney Marvin	Arts, '32	New York, N.Y.
Spencer, Walter Alan, Jr.	Eng., '34	Carbondale
Sponsler, John Bernard	E.E., '31	Williamsport
Spooner, Alfred Poole	Arts, '34	East Aurora, N.Y.
Stabler, Robert Allan	C.E., '31	Williamsport
Stack, Edward John	Arts, '31	Brooklyn, N.Y.

Standing, Alfred John, Jr.	Eng., '34	Bethlehem
Stanley, Alfred Thomas	Bus., '32	New York, N.Y.
Steadman, Christopher, Jr.	Arts., '34	Staten Island, N.Y.
Stein, Morton	Bus., '34	Newark, N.J.
Steiner, Donald	Eng., '34	Freemansburg
Stem, Edgar Samuel, Jr.	E.E., '32	Alderson
Stemler, David Reuben	Eng., '34	Mauch Chunk
Stender, Herman Gilbert	Eng., '34	Scranton
Stern, Sidney Edwin	Bus., '34	East Orange, N.J.
Stewart, Frederick Fitzgerald	Arts., '31	Tuxedo, N.Y.
Stewart, Thomas Carpenter	Arts., '34	Philadelphia
Stier, Henry Clay	Eng., '34	Pittsburgh
Stiles, Morrison Nell, Jr.	Arts., '33	Oakmont
Stiles, Samuel Robert	Eng., '34	Moorestown, N.J.
Stobaeus, John Baptist, Jr.	Bus., '34	South Orange, N.J.
Stoneback, Ira Townsend	M.E., '32	East Orange, N.J.
Stothoff, Frederick Newton, Jr.	Eng., '34	Flemington, N.J.
Stow, Louis Jackson	I.E., '32	Merchantville, N.J.
Strachan, John David	C.E., '33	Staten Island, N.Y.
Straub, Theodore Alfred, Jr.	Eng., '34	Canonsburg
Strausberg, Morris Oscar	Bus., '33	Brooklyn, N.Y.
Stroman, Joseph Brobst	Arts., '31	Bethlehem
Strong, Alan Ballentine	Eng., '34	West Orange, N.J.
Strub, Henry Michael	Eng., '34	Williamsport
Strubhar, Paul Daniel	Eng., '34	Pottstown
Stultz, Frank Paul	Arts., '34	Hollidaysburg
Stupp, Russell William	E.E., '33	Lemoine
Stutz, Frank August	Met., '31	Washington, D.C.
Stutz, Laurence Oliver	Arts., '34	Washington, D.C.
Sullivan, Arthur Alan	Bus., '31	Tenafly, N.J.
Summers, Charles Green	Eng., '34	Baltimore, Md.
Suvalsky, Matthew	Arts., '34	Malden, Mass.
Swan, Theodore Homer	Arts., '31	Philadelphia
Swanger, Walter Abram	C.E., '31	Lebanon
Sweeney, Harold Joseph	Bus., '33	West Pittston
Sweeny, Ross Fultz	Bus., '31	Nutley, N.J.
Swoyer, Robert Howard	M.E., '32	Hazleton
Sykes, Roy Arnold	Bus., '33	Paterson, N.J.
Sylvester, Robert Arthur	E.E., '31	Pottsville
Taft, John Rockwell	Bus., '33	Maplewood, N.J.
Tagert, Joseph Edward	Arts., '34	Pottstown
Taylor, Gibson Dunlop	Bus., '31	New York, N.Y.
Taylor, Leo Harold	Arts., '34	Newark, N.J.
Taylor, Robert Scott	Ch.E., '33	Pottsville
Taylor, Walter Robinson, Jr.	Eng., '34	Philadelphia
Taylor, William John, Jr.	Ch.E., '33	Pottsville
Tempest, James Alvin	Arts., '33	Catasauqua
Templeman, George Mac-Kenzie	Chem., '32	Bridgeport, Conn.

TenEyck, Hugh Skillman	Met., '31	Somerville, N.J.
Tether, Edward Joseph, Jr.	Arts, '34	Hawley
Thomas, Albert Paulding	C.E., '33	Flushing, N.Y.
Thomas, John	C.E., '32	Woodstock, N.Y.
Thomlinson, Matthew	Arts, '32	Bethlehem
Thompson, Harry Louis	Bus., '31	Montoursville
Thompson, Robert Wood	Eng., '34	Bethlehem
Thorne, Albert Monforte, Jr.	Phys., '32	Richmond Hill, N.Y.
Thornton, Arthur William, Jr.	Met., '31	McKeesport
Throckmorton, James Sansbury, III	C.E., '32	Caldwell, N.J.
Ticehurst, William Harry	E.M., '31	Shrewsbury, N.J.
Tiedeken, Theodore John Walton	C.E., '31	Camden, N.J.
Tiefenthal, Herbert Milton	Bus., '33	New York, N.Y.
Tift, Robert Lincoln	Arts., '32	Brooklyn, N.Y.
Tilles, Herman Martin	Arts, '32	Jamaica, N.Y.
Tinley, Edward Snyder	Eng., '34	Wilburton
Todd, James Scott, III	Bus., '34	Philadelphia
Toeplitz, William Richard	Met., '31	Irvington, N.J.
Tomb, Charles Emerson	Eng., '34	Coopersburg
Tomlinson, Walter John, Jr.	Ch.E., '31	Arlington, N.J.
Tonkonogy, Andrew Edison	Arts., '32	Brooklyn, N.Y.
Topping, Charles Edmund	Eng., '34	Deal, N.J.
Towers, William Lindsay	I.E., '33	South Orange, N.J.
Townend, Russell Parks	Eng., '34	Fitchburg, Mass.
Townsend, Frederick Snow	Bus., '34	New Haven, Conn.
Townsend, Robert Jean	M.E., '33	Canton, O.
Trabulsi, Kalil Paul	Bus., '31	Brooklyn, N.Y.
Treese, Carl Elwood	Eng., '34	Hollidaysburg
Trevena, Lewis Wenner	Bus., '34	Allentown
Trittle, Clarence Hoblitzelle	Eng., '34	Pittsburgh
Trost, Henry John	M.E., '31	Union City, N.J.
Tunick, Milton Gordon	Arts., '31	New York, N.Y.
Tupper, John Borden	Eng., '34	Upper Montclair, N.J.
Turn, George Boyer	Bus., '31	Binghamton, N.Y.
Turner, Charles Alexander, Jr.	Eng., '34	Ridley Park
Tuttle, Norman Judd	M.E., '33	Kingston
Twigg, Edward Vernon	C.E., '31	Shamokin
Tyler, James Edward, III	Arts., '34	Baltimore, Md.
Uhrich, Morris Bordner	C.E., '33	Myerstown
Ullman, Gerald Wood	Arts., '32	Reading
Underwood, Erwin Frederic	Arts., '31	Newport, R.I.
Underwood, Lloyd Fletcher	E.E., '32	Chatham, N.J.
Urken, Karl	Arts., '34	Trenton, N.J.
Valentine, Weston Wightman	E.E., '31	Kensington, Md.
Van Billiard, Charles Adam	Bus., '33	Bethlehem
VanderHorst, Elias, Jr.	Bus., '34	Baltimore, Md.
VanDusen, George Cross, Jr.	M.E., '31	Minneapolis, Minn.
VanHorn, Emery Lamartine	C.E., '31	Sayre

vanHorn, Frank John	Eng., '34	Scranton
VanKirk, William Keenan	Arts, '33	Elizabeth
Vannatta, Richard Weston	Arts, '31	Bethlehem
VanScoy, Alfred Davitt, Jr.	Eng., '34	Bradford
Veale, Frank Read, Jr.	Arts, '31	Glenside
Voit, Edward William	Bus., '33	Warren, O.
vom Lehn, Stanley Edward	Eng., '34	Fanwood, N.J.
von Maur, Robert Charles	Eng., '34	Toronto, Ont., Canada
Voorhees, Winthrop Dayton	Eng., '34	Summit, N.J.
Voss, Henry Alfred	Bus., '33	Brooklyn, N.Y.
Wachholtz, Walter August	Ch.E., '32	Hasbrouck Heights, N.J.
Wagner, William Herman	Met., '31	Milwaukee, Wis.
Wainright, Henry Vedder	Ch.E., '33	Manasquan, N.J.
Wainright, Walter Scott	Met., '33	Mansfield, O.
Wainwright, Harris Edward	Bus., '34	Pittsburgh
Wait, Harold Vary	Eng., '34	Houston, Tex.
Walborn, Charles Faust	C.E., '31	Wilkes-Barre
Waldron, Bernard A.	Eng., '34	Newark, N.J.
Walker, Harry Samuel	M.E., '33	West Chester
Wall, Alfred Samuel	Eng., '34	Asbury Park, N.J.
Wall, Robert Bates	I.E., '33	Chattanooga, Tenn.
Wallace, Jack David	Arts, '32	New York, N.Y.
Walsh, Joseph Russell	E.M., '31	Somerville, N.J.
Waltman, Moses Richard	Arts, '31	Brooklyn, N.Y.
Wanner, Louis Raimond	E.E., '31	Philadelphia
Ward, Daniel, Jr.	Bus., '34	Paterson, N.J.
Ware, Allen Theodore	Bus., '33	Glassboro, N.J.
Warendorf, Harry, II	Bus., '33	New York, N.Y.
Warner, Nelson Clarke	Bus., '34	Montrose
Warner, William Chamberlain	Arts, '32	Montrose
Warnick, Clarence Don	Ch.E., '32	Washington, D.C.
Warren, Walter Burgess, Jr.	Bus., '31	West Newton, Mass.
Warren, William Bradford	Bus., '33	Westfield, Mass.
Warwick, William Bond	C.E., '32	Upper Darby
Weaver, Carl Augusta	I.E., '33	Oradell, N.J.
Webber, Arthur Christian	Eng., '34	Scranton
Weber, William H. A., Jr.	Ch.E., '32	Maplewood, N.J.
Webster, William Henry Clothier	Met., '33	Philadelphia
Weicker, Raymond William	Eng., '34	Jamestown, R.I.
Weill, Victor	Arts, '34	Mount Vernon, N.Y.
Weimar, Paul John	I.E., '31	Philadelphia
Wein, Ellis	Bus., '31	New York, N.Y.
Weiner, Alex Edward	Eng., '34	Brooklyn, N.Y.
Weinstock, Harold Judas	Arts, '32	Brooklyn, N.Y.
Weiss, Clarence Carl	Ch.E., '31	Scranton
Weitz, Robert Daniel	Arts, '34	Jersey City, N.J.
Weldon, Robert George	Ch.E., '33	Mount Vernon, N.Y.
Welter, Alexander, Jr.	Eng., '34	Steelton

Werft, August Rudolph	E.M., '32	Altoona
Werner, Melvin Otto	Bus., '34	Nazareth
Wert, James VanAtta	Ch.E., '32	Hackettstown, N.J.
Wesner, Ralph	C.E., '31	Pottstown
Weysser, John Louis Gallus	E.M., '31	Paxinos
Whims, Paul Laurence	E.M., '31	Saint Clair
White, Roland Stedman	Bus., '31	Suffield, Conn.
Whitehead, Ross	M.E., '31	Pawtucket, R.I.
Whitenight, Harvey Aurand, Jr.	Chem., '32	Allentown
Whitney, Myron Edward	E.E., '33	Philadelphia
Whitlock, William Baker	E.M., '31	Hummelstown
Widdowfield, Arthur Samuel	Eng., '34	Scranton
Widger, Duane Lloyd	Arts, '34	Scranton
Wiegner, James Robert	Ch.E., '31	Bethlehem
Wilde, Norton Charles	C.E., '31	New York, N.Y.
Wildman, Eugene Lee, Jr.	Eng., '34	Baltimore, Md.
Wilkinson, Donald Elverson	Bus., '31	Meriden, Conn.
Willenbecher, James Frederic	E.E., '33	Allentown
Williams, Duane Burnett	Bus., '34	Ridgewood, N.J.
Williams, John Geyer	M.E., '33	Bethlehem
Williams, John Joseph	Eng., '34	Bethlehem
Williams, Miller	Eng., '34	Philadelphia
Williamson, Eugene Nevins	E.E., '33	Brooklyn, N.Y.
Williamson, John Louis	I.E., '32	Miami, Fla.
Willis, Richard Lewis	M.E., '33	Bethlehem
Wilson, Robert James	Bus., '33	Philadelphia
Wilson, Stanmore VanNess	I.E., '33	East Orange, N.J.
Winblad, Wilbur Carl	Eng., '34	Brooklyn, N.Y.
Winkler, David Waldemar	Ch.E., '32	Bethlehem
Wise, Franklin Bratt	Ch.E., '33	Dover, Del.
Wisner, Edwin Reinhold	I.E., '33	Sewickley
Witemeyer, Benton Diehl	Ch.E., '32	Bethlehem
Withrow, William Edgar	E.E., '33	Manasquan, N.J.
Witmer, Benjamin Franklin	Eng., '34	Lancaster
Witt, Henry Puster	Eng., '34	Ramsey, N.J.
Wittmer, Henry	Arts, '33	Pittsburgh
Wolcott, George Linton	Eng., '34	Red Bank, N.J.
Wolf, Edwin Adolph	Chem., '32	Narberth
Wolf, Harold William	Eng., '34	Allentown
Wolf, William Robert	Eng., '34	Little Neck, N.Y.
Wolfe, Theodore Allen	E.E., '31	Elmhurst
Wolff, James Patterson	Bus., '34	Waynesboro
Wood, Adriance Howland	Ch.E., '32	New Rochelle, N.Y.
Wood, Howard Dalton	Bus., '31	Wilmington, Del.
Wood, William Gilchrist	Eng., '34	South Orange, N.J.
Woods, Charles Thompson	Eng., '34	Toronto, Ont., Canada
Worthington, Edward Hedden, Jr.	Eng., '34	East Stroudsburg

Wright, David Graham	Eng., '34	Philadelphia
Wyckoff, Barkley, Jr.	Bus., '33	Glen Ridge, N.J.
Yaffe, Charles	Bus., '33	Reading
Yerrick, Charles, Jr.	Eng., '34	Scranton
Yingling, David	Eng., '34	Johnstown
Yocum, Robert Curtis	I.E., '31	Shamokin
Yotter, Richard Kinsey	Bus., '34	Easton
Young, Milton Gabriel	Phys., '32	Coopersburg
Young, Paul Oscar	Phys., '32	Kingston
Young, William Alson	Bus., '34	Coopersburg
Young, William Cope	E.E., '33	East Orange,, N.J.
Youngblood, Robert Nixon	I.E., '33	Wilkes-Barre
Youngerman, Abraham Arnold	Arts, '34	New York, N.Y.
Youngman, William Airey	Bus., '34	Hazleton
Zabriskie, Frederick Nathaniel	Arts, '31	Hackensack, N.J.
Zabriskie, Harold Benedict	C.E., '33	Hackensack, N.J.
Zakorka, Zigman Walter	E.M., '31	Scranton
Zendt, Harvey Barndt	Eng., '34	Souderton
Zenitz, Julian Leon	I.E., '31	Baltimore, Md.
Zimmerman, Manley Walter	Eng., '34	Berwick
Zitserman, Peter Jacob	Arts, '34	Providence, R.I.
Zoble, Robert	Arts, '31	Trenton, N.J.
Zonge, Randolph Daniel	Ch.E., '32	Williamsport
Zuckerman, Albert	Bus., '34	Philadelphia

SPECIAL STUDENTS

London, Russell	Arts	Philadelphia
Porzig, Charles Frederick	Bus.	Newark, N.J.
Wuensch, Robert Haws	Bus.	South Orange, N.J.

SUMMER SESSION, 1930

Abbe, Richard Taylor	Kennett Square
Anamisakis, Anthony Fotis	Bethlehem
Anderson, Frank George	Takoma Park, D.C.
Anderson, Judith	Bethlehem
Andrews, John Greer	Washington, D.C.
Angle, Theodore Robison, Jr.	Danville
Arthur, William Leighley	Pittsburgh
Aucott, William Connery	Philadelphia
Ayer, Fosdick Whitney	Plainfield, N.J.
Ayers, Allan, Jr.	Elizabeth, N.J.
Ayre, Thomas, Jr.	Miner's Mills
Bachman, Robert Ruch	Drexel Hill
Bachman, Walter Crawford	Nazareth
Bailey, Oakford Chandler	Pennsville, N.J.
Baker, Joseph Boyd	Pittsburgh
Baldwin, Armand Raphael	Lansford
Bangsberg, Robert Ethan	LaCrosse, Wis.
Barney, Jerome	Wilkes-Barre
Bascom, Franklin Buel	Allentown
Baur, Albert Campbell	Bethlehem
Beaver, Donald Payne	Bethlehem
Beggs, Douglas Raiguel	Reading
Behney, Paul Aaron	Freeland
Bell, James McKim, Jr.	Rio de Janiero, Brazil
Bell, John Wade, Jr.	Quinwood, W.Va.
Belmore, Albert Joseph, Jr.	Schuyler, Va.
Benetz, Hans	Doylestown
Bennett, Charles Albert	White Plains, N.Y.
Benson, Arthur Leonard	Easton, Md.
Berger, Francis Joseph	Old Forge
Berlin, Aaron Samuel	Wilmington, Del.
Bienfang, George John	Linden, N.J.
Bierling, Benjamin Herbert	Monsey, N. Y.
Bilski, Peter John	Jermyn
Bishop, Charles Justus	Scranton
Bliss, Wilbur Agnew, Jr.	Beaver
Bloomer, Rundle Waite	Brewster, N.Y.
Blumberg, Eugene	Wyomissing
Bohner, John Allen	Catasauqua
Bollman, John Adam	Lebanon
Bomhoff, Lewis Fred, Jr.	Jackson, Mich.
Boquel, Francis Peter	Bethlehem
Borden, Kennard Fleming	Collingswood, N.J.
Bounds, Ardrey Middleton	Philadelphia
Boyd, Robert Putnam	Staten Island, N.Y.
Boyer, Harry Jeremiah	Egypt
Branda, Richard Randolf	Hamilton, Ont., Canada

Brandner, John David	Bethlehem
Braun, Robert Carl	Reading
Brewer, John Gilmore	Pittsburgh
Bronstein, Jesse Bayliss, Jr.	Allentown
Brooks, Leonard	Philadelphia
Brumbach, George Edward	Esterly
Burk, Russell Williams	Newark, N.J.
Busch, Herbert Hertgen	Newark, N.J.
Byers, Lewis Cunningham	Catonsville, Md.
Byers, Richard McCulloch	Catonsville, Md.
Cadmus, Richard Henry	Pottstown
Campbell, Charles, Jr.	Fullerton
Campbell, Charles, Jr.	Pittsburgh
Canova, Remo	Allentown
Carl, Howard Frederick	Washington, D.C.
Carrillo, Andres, Jr.	Habana, Cuba
Charles, William Henry, Jr.	Riverside, Ill.
Civardi, Walter Louis	Bayside, N.Y.
Clark, Diar Ellsworth	Deposit, N.Y.
Clarke, Jess Fellows	Buffalo, N.Y.
Cleaver, Thomas Stevens	Reading
Clegg, William James	Pittsburgh
Clifford, Donald Berridge	Manhasset, N.Y.
Clocker, Edwin Thompson	Bethlehem
Coe, Edwin Merritt	Suffern, N.Y.
Coffin, Stanley Nelson	Bethlehem
Cohen, Albert	Brooklyn, N.Y.
Collins, Joseph Gerard	Scranton
Comins, Harrison Durgin	Vineland, N.J.
Connelly, John Robert,	
B.S. in M.E., M.S.	Danville, Ill.
<i>(University of Illinois)</i>	
Cook, Nevin John B.A.	Drums
<i>(Lehigh University)</i>	
Cooper, Charles William	Sewickley
Cooper, George Ellsworth	Coopersburg
Copp, William Clifford	Flushing, N.Y.
Coroniti, Samuel Charles	Marion Heights
Crispen, Hibberd Reese	Harrisburg
Crocco, Samuel Robert	Weedville
Crompton, Robert Henry, Jr.	Philadelphia
Culverwell, Joseph Mason	Washington, D.C.
Current, Watson Edward	Belleville, N.J.
Cushman, Hall Watson	Bayside, N.Y.
Cyphers, Elmer Benjamin	Bethlehem
Dakin, Robert Calvin	Scranton
Danko, Joseph Thomas	McKeesport
Datwyler, Howard Edward	Flushing, N.Y.
Davies, Rosa Ellen, B.S. in Ed.	Bethlehem
<i>(Temple University)</i>	

- Davis, Robert Lincoln
 Day, Gaylord Hill
 Decker, Robert Benjamin
 Dengler, Robert Meyer
 De Turk, Elder Pattison
 Deutschman, Manuel
 Dew, James Harry, B.S.
 (*Muhlenberg College*)
 Diener, Karl Miller
 Dillinger, Robert L.
 Dorney, Donald Frederick
 Dornin, George Armstrong, Jr.
 Dougherty, Nancy
 Dow, Langdon Cheves
 Drake, Herbert Ernest
 Drobek, Thaddeus William
 Drukker, Raymond Henry
 Duncan, Arno Lee Roy, Jr.
 Duncan, James Edwin, III.
 Dunnells, Cora Knutsford
 Dunnells, Dorothy Rene, B.S., M.S.
 (*Carnegie Institute of Technology, Yale University*)
 Eagan, John William, Jr.
 Earich, Robert Allen George
 Ebert, David Mathias
 Eddleston, James Henry
 Elleni, Albert Umberto
 Elly, Robert Duncan
 Engel, John Augustine
 Enke, George Pryor, Jr.
 Erb, Albert Schmidt, B.S.
 (*Muhlenberg College*)
 Evers, Eben Francis
 Eyster, Franklin Spangler
 Eyster, William Myers, III.
 Fairchild, Matthew Gilbert
 Faust, Henry Joseph
 Felton, Walter Wiest
 Feucht, Robert
 Fisher, Frank Lynn
 Flanagan, Pierce John Lawrence, Jr.
 Flaster, Joel Manuel
 Folwell, John Davies
 Forsyth, Henry James
 Foster, Kenneth Leroy
 Frace, John William
 Fralick, Ralph Stoddart
 Frankenfield, Charles Walter
 Frazier, Donald Gordon
 Freed, Henry
 Norfolk, Va.
 Perry Point, Md.
 Elizabeth, N.J.
 Shenandoah
 Reading
 Easton
 Easton
 Hamburg
 Allentown
 Allentown
 Baltimore, Md.
 Bethlehem
 Trucksville
 East Orange, N.J.
 Reading
 Passaic, N.J.
 Shillington
 Washington
 Bethlehem
 Pittsburgh
 Youngstown, O.
 Bethlehem
 Wilmington, Del.
 Easton
 West Pittston
 Elizabeth, N.J.
 Stamford, Conn.
 East Orange, N.J.
 Easton
 East Aurora, N.Y.
 York
 York
 Monterrey, N.L., Mexico
 Catasauqua
 Columbia
 Lambertville, N.J.
 Pottsville
 Baltimore, Md.
 Brooklyn, N.Y.
 Allentown
 Buffalo, N.Y.
 Rockville Center, N.Y.
 Easton
 New York, N.Y.
 Coopersburg
 East Orange, N.J.
 West Pittston

Freese, Frank Bernard	Lyndhurst, N.J.
Freiday, Donald Herbert	East Orange, N.J.
Freiday, Horl Jay	East Orange, N.J.
French, Frank John	New Rochelle, N.Y.
French, Walter Clayton	Philadelphia
Fritz, John Raymond	Reading
Fritz, Samuel Frederick	Reading
Fritz, William Charles	Bethlehem
Fry, Nelson Becker, Jr.	Bala-Cynwyd
Fuhrer, Walter	Jersey City, N.J.
Fuller, James Osborn	Bethlehem
Gadd, Robert Foster, Jr.	Hartford, Conn.
Gamble, Robert William	Allentown
Gamble, William John, Jr.	Allentown
Gangewere, Chester Weierbach	Allentown
Garrett, Robert Heil	Frackville
Geehr, Frederick Franklin	Easton
Gemmel, Richard Harold	Catasauqua
Gherst, Richard Hummel	West Lawn
Gibbs, William Charles	Netcong, N.J.
Gilbert, Roswell Ward	Brooklyn, N.Y.
Girdler, Tom Mercer, Jr.	Sewickley
Glover, John Michael	St. Mary's
Godkin, Willard Joseph	Bethlehem
Gold, Lester Charles	Bethlehem
Goldsmith, Emil Schott	Bernardsville, N.J.
Goyne, Ralph Carol	Ashland
Green, Charles Everard Joseph	Duluth, Minn.
Griesinger, William Kenneth	Plainfield, N.J.
Guyer, Evan Henry	Buffalo, N.Y.
Haas, William Augustus Sebastian	Freeport, N.Y.
Haley, Robert Martin	Syracuse, N.Y.
Hamburger, Louis Benjamin Gerard	Mount Vernon, N.Y.
Hammond, Arthur LeRoy	Brooklyn, N.Y.
Hamp, John Wilson	Staunton, Va.
Harleman, Samuel Thomas, Jr.	Bethlehem
Harris, Robert Harris	Narberth
Hart, John Henry, Jr.	Bethlehem
Hart, William Winebiddle Phillips	Bethlehem
Hartman, Earl John, B.A.	Slatington
<i>(Bucknell University)</i>	
Hawkins, Henry Price	Salem, N.J.
Hawkins, Thane Edwin	Harrisburg
Hazen, John Mercer	Bethlehem
Hemingway, Ellsworth Lowell	Bridgeport, Conn.
Henricks, Mark Willis	Pottstown
Herb, Probert Edwards	Luzerne
Hertslet, Victor Beardsley	Rowayton, Conn.
Hertzog, Rudolph Henry	Bethlehem
Herwig, Dixon Joseph	Allentown

Heyman, Milton Lawrence
 Hickman, William DeForest
 Hicks, Vernet Nelson
 Himsworth, Winston Edge
 Hindson, Theodore Phillip
 Hirtle, Jerome Evan, Jr.
 Hobson, Joseph Mansfield
 Holahan, John James
 Hollenbach, Aral Miles, B.S.

(Muhlenberg College)

Homsher, Joseph Bert
 Hoover, Marcus Lacer
 Horn, Lulu Carpenter
 Horn, Woodrow Washington
 Horner, Hugh
 Horvath, Paul Joseph
 Hottinger, Edwin Jack
 Hottle, George Austin
 Hough, John Beekman
 Hoyt, Alvord
 Hoyt, Harry Wibert
 Illick, Montford Elroy, B.S.

(Lafayette College)

Jaggard, Henry Brill
 Jampol, Warren Sidney
 Johnson, Daniel Pierson
 Jones, Frank Addison
 Jones, Robert Duggan
 Kahn, Milton Walter
 Kaufman, Jack Henry
 Kaufmann, Emerson Wertz
 Keefe, Leo Francis
 Keller, George Henry
 Kelley, Walter Harvey, Jr.
 Kellstedt, Charles Ward
 Kerst, Orum Roehrer
 Kesser, Charles Wister
 King, Wendell Reuben
 Kinsinger, Walter Willis
 Kistler, Effie Mildred, A.B.

(Cedar Crest College)

Knipe, Robert Krauss
 Koehler, Paul Frederick
 Koons, Edwin Henry
 Kratz, Philip, Ch.E.

(Lehigh University)

Kremer, Erich Conrad Gustav
 Kriebel, Henry August
 Krone, Robert
 Kugler, Robert Green

Danbury, Conn.
 Arlington, N.J.
 Wharton, N.J.
 Flushing, N.Y.
 Freeland
 Bath
 Philadelphia
 Reading
 Allentown

Strasburg
 Pottstown
 Bethlehem
 Bangor
 Bath
 Bethlehem
 Kenvil, N.J.
 Bethlehem
 New York, N.Y.
 New Haven, Conn.
 Danbury, Conn.
 Hellertown

Berlin, N.J.
 New Rochelle, N.Y.
 Swarthmore
 Washington, D.C.
 Kingston
 Stamford, Conn.
 Wilmette, Ill.
 Wyomissing
 Rutland, Vt.
 York
 Bethlehem
 Flushing, N.Y.
 Jersey City, N.J.
 Philadelphia
 Richland
 Harrisburg
 Allentown

Philadelphia
 Pleasantville, N.J.
 Catasauqua
 Bethlehem

Paterson, N.J.
 Allentown
 Hackensack, N.J.
 East Orange, N.J.

Kuklentz, Kenneth LeRoy	Bethlehem
Kulp, Samuel Randall	Bethlehem
Laftman, Richard Nicholas	Bayonne, N.J.
Lanahan, Ellwood Royal	Philadelphia
Land, Sidney	Brooklyn, N.Y.
Landis, Robert Prince	Sound Beach, Conn.
Landy, Samuel Henry	Philadelphia
Langhaar, John Williamson	Allentown
Laporta, Xavier Vincent	Weedville
Larkin, Franklin Jonathan	Bethlehem
Laschober, Eugene William, Jr.	Belvidere, N.J.
Laubach, Benjamin William, B.S. (<i>Muhlenberg College</i>)	Catasauqua
Lawrence, Walter Welling	Brooklyn, N.Y.
Legge, Edwin Thomas	Bound Brook, N.J.
Lehr, Charles Frederick	Stockertown
Lembeck, Paul Joseph	Summit, N.J.
Lewis, George	Brooklyn, N.Y.
Lewis, Thomas Richard, Jr.	Jersey City, N.J.
Linton, Thomas	Palmerton
Lloyd, John Armon	Wilkes-Barre
Lodge, Richard Aspril	Philadelphia
Lohse, John Mueller	Glen Ridge, N.J.
Lorson, Frank Edward, Jr.	New Rochelle, N.Y.
Lowry, William Watt	Chicago, Ill.
Lunger, Erwood Halsey	Morristown, N.J.
MacDougall, Douglas	New York, N.Y.
MacDougall, Willis Clayton	East Orange, N.J.
Magyar, John Joseph	Bethlehem
Maier, Franz Joseph	Royersford
Marks, Charles Edwin, Jr.	Yonkers, N.Y.
Marvel, Albert James	Easton, Md.
Mathison, George Shimer	Philadelphia
May, Donald Henry	Hazleton
Maylott, Carleton Francis, B.S. in E.E. (<i>Worcester Polytechnic Institute</i>)	Derby, Conn.
Mayo, Robert Bass	Takoma Park, D.C.
Mayrosh, Joseph John	Easton
McCluskey, Frank, Jr.	Easton
McConahey, Hugh Milner	Wilkinsburg
McCurley, William Stran, Jr.	Baltimore, Md.
McElwain, John Stanley	Sewickley
McGarrity, William Fisher	Youngstown, O.
McHugh, Edward Joseph	Philadelphia
McLaughlin, Conrad	Philadelphia
McLean, Harry Laurance	Scranton
McLernon, Joseph Francis	Bethlehem
Mertz, John Clewell	Allentown
Mestre, Abel	Santiago, Cuba
Metzgar, Russell Eugene	Nazareth

- Millelot, Leon Sylvester
 Miller, Carl Andrew
 Miller, Donald
 Miller, Dorothy Devorah
 Miller, Dustin Yach
 Miller, Nathan
 Miller, William Francis
 Minogue, Carolyn Elizabeth
 Mintz, Gerald Emanuel
 Mitchell, George Henry, Jr.
 Mitchell, Grable Harry
 Mommers, Theodor Wallace
 Moomy, Richard Eugene Llewellyn
 Moorhead, Helen
 Moorhead, Herman Alexander
 Mueller, William Fred
 Murphey, John Nicholas
 Murphy, Joseph T.
 Myers, Robert Julius
 Myers, Richmond Elmore, A.B., A.M.
 (Moravian College, University of Pennsylvania)
 Myra, Allen Esekial
 Napravnik, Joseph
 Narzizi, Filadelfio
 Nevins, Hugh
 Newcomb, Thomas Warwick
 Newhard, Henry Thomas
 Newhard, Stella Elizabeth, Ph.B.
 (Muhlenberg College)
 Nisbet, George Porter
 Nisbet, Robert Alexander
 Nora, Thomas Edward
 Norwood, Hayden Eugene
 Obert, Horace Dickinson
 Ogden, Gordon Prentiss
 Osborn, Harry Brooks, Jr.
 Papa, Joseph Charles
 Partridge, Seymour Truman
 Payrow, Lillian Gordon
 Peck, Clarence Bardwell, Jr.
 Pennington, Robert Janvier
 Pentz, Harold Henry
 Petillo, John Anthony
 Pflaumer, Arthur Eugene
 Pflaumer, George Monroe
 Poggi, Edmund Howe, Jr.
 Porter, Robert Shelly
 Post, Alfred Philip, Jr.
 Powers, Richard Mair
 Pragnoski, John Felix
 Lyndhurst, N.J.
 Rosebank, N.Y.
 Scranton
 Bethlehem
 Lyndhurst, N.J.
 Bethlehem
 Easton
 Bethlehem
 Allentown
 New York, N.Y.
 Washington, D.C.
 Baltimore, Md.
 Carlisle
 Easton
 Buffalo, N.Y.
 Jersey City, N.J.
 Kerhonkson, N.Y.
 Phillipsburg, N.J.
 Elkins Park
 Bethlehem
 Lunenburg, N.S., Canada
 Freemansburg
 Bethlehem
 Hokendauqua
 Long Branch, N.J.
 Fullerton
 Allentown
 Pittsburgh
 Pittsburgh
 New Brunswick, N.J.
 Bethlehem
 Lehighton
 Great Neck, N.Y.
 Newark, N.J.
 Philadelphia
 Northville, N.Y.
 Bethlehem
 Charleston, W.Va.
 Trenton, N.J.
 Bethlehem
 Red Bank, N.J.
 Philadelphia
 Philadelphia
 Wilkes-Barre
 East Northfield, Mass.
 Philadelphia
 Newton Centre, Mass.
 Shenandoah

Prentiss, Henry Moeller, Ph.B. (<i>Muhlenberg College</i>)	Easton
Quinn, Joseph Aloysius	Pittston
Rabinowitz, Benjamin	Scranton
Rather, James Burness, Jr.	Brooklyn, N.Y.
Reed, George Douglas	Baltimore, Md.
Reep, Carl Cushman	Bethlehem
Regar, Philip Waters	Collegeville
Reichenbach, John Henry	Bethlehem
Reynolds, Jane Nibloch	Bethlehem
Reynolds, Thomas Bernard	Phillipsburg, N.J.
Rhoades, William Taylor	West Point, N.Y.
Rhoads, James Crisman	Harrisburg
Ricards, Atwood Jester	Marshallton, Del.
Rigling, Vance Fager	New Cumberland
Riley, George Hempstead	Hagerstown, Md.
Ritter, Stewart Elwood, Jr.	Allentown
Riviere, Burt Henry	Pittsburgh
Robar, Henry John	Bethlehem
Roberts, Edwin Raphael	Mahanoy City
Roberts, Lynn Croll	Buffalo, N.Y.
Rock, John Hampton	Fairmont, W.Va.
Rohrer, Frederick Findlay, Jr.	Wilkinsburg
Ross, Edwin Morrison	Philadelphia
Roy, Robert Merton	Sussex, N.J.
Rueda, Jorge Gustavo	Mamaroneck, N.Y.
Ruffer, Harry Herman	Westfield, N.J.
Sahm, Henry Spencer	Scranton
Saler, Harold Benjamin	Philadelphia
Savage, Rufus Llewellyn, Jr.	Asbury Park, N.J.
Scheer, Henry Conrad, Jr.	Glen Ridge, N.J.
Schenck, Mead, Jr.	Pittston
Schier, Carl Frederick, Jr.	Ellicott City, Md.
Schoffstall, Charles Foster, Ph.B. (<i>Muhlenberg College</i>)	Pottsville
Schrope, Guy Sylvester, B.S. (<i>Muhlenberg College</i>)	Allentown
Shuck, William Mitchell	Philadelphia
Schuyler, Elmer VanNess	Upper Darby
Scofield, Francis Collins	Lanham, Md.
Seiler, Edwin William	Maplewood, N.J.
Shaw, Franklin Bolton	Swedesboro, N.J.
Shelhart, John William	Cleveland, O.
Shields, Agnes Gertrude, B.A. (<i>Moravian College</i>)	Bethlehem
Shimer, Stewart Applegate, Jr.	Bethlehem
Sievering, Howard	Maplewood, N.J.
Simcoe, William Henry	Trenton, N.J.
Simes, Rowland James, Jr.	Brooklyn, N.Y.
Simpson, William Carl	Columbia, N.J.

Sinclair, Alonzo Loraine
 Skelly, John Scott, Jr.
 Slaughter, Page Harrison, Jr.
 Slichter, Charles Byron
 Small, Edward Nicholas
 Small, Geraldine Genevieve
 Smith, Robert Clifford, Jr.
 Snavely, Frank Lichty
 Snyder, Richard Lee, Jr.
 Somers, William Eugene
 Sosna, Rudolph Joseph
 Steidle, William Jacob, B.A.
(Lehigh University)
 Stender, Herman Gilbert
 Stettler, Willard Beisel
 Stier, Henry Clay
 Stofan, Andrew John, B.A.
(Lehigh University)
 Stoneback, Ira Townsend
 Stotz, Olga Judd
 Stow, Louis Jackson
 Strachan, John David
 Stroman, Joseph Brobst
 Stubblebine, Gladys
 Stultz, Frank Paul
 Stupp, Russell William
 Sweeney, Harold Joseph
 Taylor, Gibson Dunlop
 Taylor, Robert Norman, Ph.B.
(Muhlenberg College)
 Templeman, George MacKenzie
 Thiele, Domer Herman
 Thierolf, Russell Lloyd
(Lafayette College)
 Thomlinson, Matthew
 Thorne, Albert Monforte, Jr.
 Thornton, Arthur William, Jr.
 Todd, James Scott, III.
 Toeplitz, William Richard
 Tomb, Charles Emerson
 Tomlinson, Walter John, Jr.
 Towers, William Lindsay
 Townend, Russell Parks
 Trabulsi, Kalil Paul
 Trost, Henry John
 Tuttle, Norman Judd
 Uhrich, Morris Bordner
 VanderHorst, Elias, Jr.
 vanHorn, Frank John
 Van Kirk, William Keenan

Norristown
 Monongahela
 East Aurora, N.Y.
 Reading
 Westbury, N.Y.
 Catasauqua
 Shawnee
 Lancaster
 Glassboro, N.J.
 Youngstown, O.
 Philadelphia
 Jamesburg, N.J.

Scranton
 Allentown
 Pittsburgh
 Eckley

East Orange, N.J.
 Easton
 Merchantville, N.Y.
 Staten Island, N.Y.
 Bethlehem
 Easton
 Hollidaysburg
 Lemoyne
 West Pittston
 New York, N.Y.
 Hellertown

New Haven, Conn.
 Johnstown
 Bethlehem

Bethlehem
 Richmond Hill, N.Y.
 McKeesport
 Philadelphia
 Irvington, N.J.
 Coopersburg
 Arlington, N.J.
 South Orange, N.J.
 Fitchburg, Mass.
 Brooklyn, N.Y.
 Union City, N.J.
 Kingston
 Myerstown
 Baltimore, Md.
 Scranton
 Elizabeth

Van Nakin, Clarence Igness	Deposit, N.Y.
Vennum, Robert Riddell	Wilmington, Del.
Voit, Edward William	Warren, O.
Vreeland, Everett B.	Towaco, N.J.
Wainright, Walter Scott	Mansfield, O.
Wall, Robert Bates	Chattanooga, Tenn.
Wallace, William Carson, A.B. (<i>Lafayette College</i>)	Easton
Warnick, Clarence Don	Washington, D.C.
Weaver, Ruth Dilgert Amelia	Bethlehem
Webster, William Henry Clothier	Philadelphia
Weiss, Clarence Carl	Scranton
Werft, August Rudolph	Altoona
Wert, James Van Atta	Hackettstown, N.J.
Weysser, John Louis Gallus	Paxinos
Whitenight, Harvey Aurand, Jr.	Allentown
Whitney, Myron Edward	Philadelphia
Widdowfield, Arthur Samuel	Scranton
Widger, Duane Lloyd	Scranton
Wiegner, James Robert	Bethlehem
Wilkinson, Donald Elverson	Meriden, Conn.
Willenbecker, James Frederic	Allentown
Willets, William Madeira, B.S. (<i>Lafayette College</i>)	Reading
Williams, John Geyer	Bethlehem
Willis, Richard Lewis	Bethlehem
Wilson, Harry Stephen	Brooklyn, N.Y.
Wilson, Stanmore Van Ness	East Orange, N.J.
Winkler, David Waldemar	Bethlehem
Wise, Franklin Bratt	Dover, Del.
Wisner, Edwin Reinhold	Sewickley
Witemeyer, Benton Diehl	Bethlehem
Withrow, William Edgar	Manasquan, N.J.
Wittmer, Henry	Pittsburgh
Wolf, Edwin Adolph	Narberth
Wood, Adriance Howland	New Rochelle, N.Y.
Wood, Petrina	Bethlehem
Worthington, Edward Hedden, Jr.	East Stroudsburg
Wyckoff, Barkley, Jr.	Glen Ridge, N.J.
Wynkoop, William	Scranton
Young, Milton Gabriel	Coopersburg
Young, Paul Oscar	Kingston
Young, William Alson	Coopersburg
Young, William Cope	East Orange, N.J.
Youngblood, Robert Nixon	Wilkes-Barre
Zabriskie, Harold Benedict	Hackensack, N.J.
Zonge, Randolph Daniel	Williamsport

SUMMARY OF STUDENTS BY CLASSES AND CURRICULA

Undergraduates	Seniors	Juniors	Sophomores	Freshmen	Unclassified	Special Students	Total
Arts and Science.....	71	75	67	102	....	1	316
Business Administration.....	64	67	100	142	1	2	376
Chemical Engineering.....	28	33	37	.....	....	....	98
Chemistry	2	4	3	.....	....	....	9
Civil Engineering.....	30	17	26	.....	....	....	73
Electrical Engineering.....	30	11	23	.....	....	....	64
Engineering Physics.....	5	11	5	.....	....	....	21
Industrial Engineering.....	13	17	36	.....	....	....	66
Mechanical Engineering.....	25	19	30	.....	....	....	74
Metallurgical Engineering...	13	11	21	.....	....	....	45
Mining Engineering.....	16	12	6	.....	....	....	34
Freshman Engineering.....	....	....	....	382	....	....	382
Total	297	277	354	626	1	3	1558
Graduate Students							99
Undergraduates							1558
Students in Summer Session, 1930.....							468
Total, less duplications.....							1736

GEOGRAPHICAL DISTRIBUTION OF STUDENTS, 1930-1931

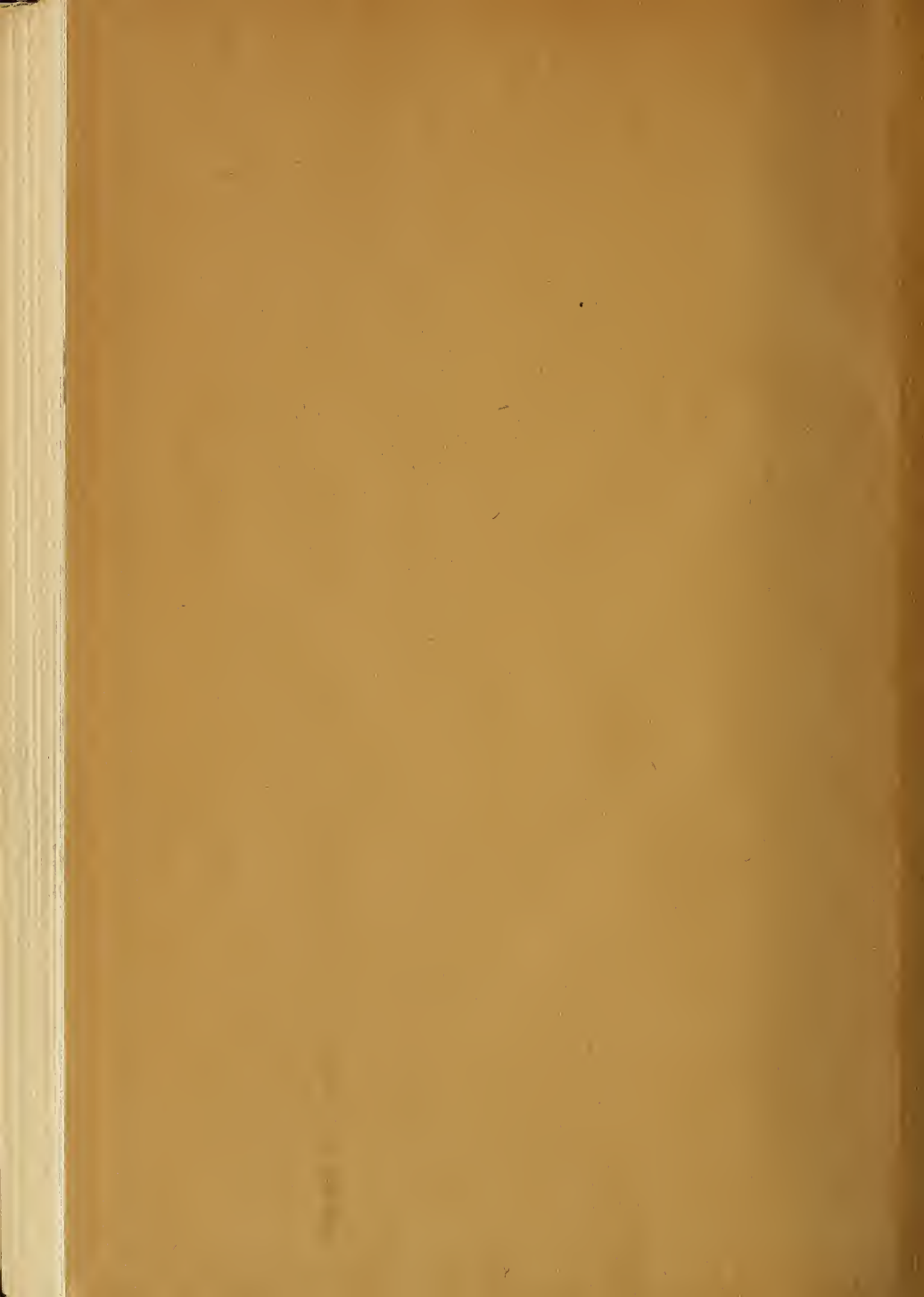
Alabama	3
California	1
Colorado	1
Connecticut	37
Delaware	18
District of Columbia.....	24
Florida	1
Georgia	1
Illinois	8
Indiana	4
Iowa	1
Kansas	2
Maryland	42
Massachusetts	19
Michigan	5
Minnesota	2
Missouri	1
Nebraska	1
New Jersey	341
New York	308
Ohio	21
Oklahoma	1
Oregon	1
Pennsylvania	837
Rhode Island	5
South Carolina	3
Tennessee	3
Texas	5
Utah	1
Vermont	1
Virginia	8
West Virginia	8
Wisconsin	5
Wyoming	1
Brazil	1
Canada	5
Costa Rica	1
Cuba	3
England	2
Germany	2
Italy	1
Mexico	1
Total	1736

INDEX

- Accounting, 78
 Accredited schools, 27
 Administrative officers, 22
 Admission, 25
 Advanced standing, 29
 Alumni Association, 205
 Alumni Memorial Building, 187
 Alumni Prizes, 198
 Arboretum, 189
 Archer-Daniels-Midland Co. & Wm. O. Goodrich Co. Fellowships, 196
 Armory, 188
 Arts and Science, 25, 42
 Astronomy, 136, 184
 Athletics, Board of Control, 202
 Baldwin Fellowship, 195
 Band, 175
 Barrett Leather Co. Fellowship, 195
 Biology, 74
 Botany, see Biology
 Buildings and Grounds, 179
 Business Administration, 26, 49, 78
 Byllesby Fellowships, 194
 Calendar, 2, 3
 Carson Prize, 197
 Chandler Chemistry Lab., 179
 Chandler Prizes, 197
 Chapel, 174
 Chemical Engineering, 56, 82, 179
 Chemistry, 58, 82, 179
 Chemistry Fellowships, 196
 Christmas-Saucon Hall, 184
 Civil Engineering, 60, 92, 182
 College Board Exams., 29
 Coppee Hall, 184
 Courses of Instruction, 74
 Course Societies, 203
 Coxie Memorial Fund, 193
 Coxie Mining Laboratory, 183
 Degrees conferred, 1930, 207
 Description of courses, 74
 Dispensary service, 201
 Dormitories, 186
 Drown Memorial Hall, 187
 duPont Prize, 197
 Economics, 78
 Education, 160
 Electrical Engineering, 62, 97, 189
 Electrical Eng. Prize, 197
 Engineering, College of, 26, 52
 Engineering Foundation Fellowships, 196
 Engineering Physics, 64, 179
 English, 104
 Entrance requirements, 25
 Examinations for admission, 28
 Expenses, 41
 Faculty, 7
 committees, 20
 Fees and expenses, 39
 Fellowships, 193
 Financial Aid, 192
 Fine Arts, 110
 Founder's Day, 205
 Fraternities, 204
 Frazier and Ringer Fund, 193
 French, 170
 Fritz Engineering Lab., 182
 Geology, 111
 German, 116
 Government, 125
 Graduate courses, 30
 Greek, 117
 Haines Scholarship, 191
 Health Service, 200
 History, 120
 Honorary societies, 202
 Honors and prizes, 215
 Hunt-Rankin Leather Co. Fellowship, 195
 Industrial Engineering, 66, 141
 Inspection trips, 55
 Institute of Research, 178
 Institute of Research Fellowships, 196
 Italian, 174
 Journalism, 108
 Late-registration fee, 40
 Latin, 127

- Lehigh Field, 188
 Lehigh Union, 202
 Library, 185
 Mathematics, 131
 Mechanical Engineering, 68, 137, 189
 Medicine, preparation for, 47
 Mercur Scholarships, 191
 Metallurgical Engineering, 70, 142, 181
 Military Sci. and Tactics, 148
 Mining Engineering, 72, 151, 183
 Music, 154
 N. J. Zinc Co. Fellowship, 194
 Nostrand Scholarship, 191
 Packard Electrical and Mechanical Laboratory, 189
 Packard Fellowship, 195
 Packer, Asa, Founder, 199, 205
 Packer Hall, 179
 Packer Memorial Church, 185
 Phi Beta Kappa, 202
 Philosophy, 154
 Physical Education, 163
 Physical examinations, 200
 Physics, 165, 179
 Physics Laboratory, 179
 Placement Service, 200
 Political Science, see History and Government
 President's Fund, 193
 Price Hall, 187
 Prizes and honors, 215
 Prizes, 197
 Psychology, 157
 Public Speaking, 108
 Refunds of fees, 40
 Registration days, 3
 Research Fellowships, 193
 Reserve Officers' Training Corps, 148
 Romance Languages, 170
 Sayre Observatory, 184
 Sayre Park, 189
 Scholarships, 190
 Sigma Xi, 203
 Sociology, 82
 Spanish, 172
 Special students, 30
 Student Chemistry Foundation, 196
 Student Employment and Housing, 202
 Student organizations, 204
 Student publications, 205
 Students, 1930-1931, 221
 Summer Session, 176
 Tau Beta Pi, 202
 Taylor Field, 188
 Taylor Gymnasium and Field House, 187
 Taylor Hall, 186
 Teacher Placement, 200
 Teaching, preparation for, 47
 Theses, graduating, 200
 Trustees, Board of, 5
 Tuition, 39
 University Day, 205
 Wilbur Engineering Lab., 180
 Wilbur Prizes, 197
 Wilbur Scholarship, 191
 Williams Fund, 193
 Williams Hall, 180
 Williams Prizes, 198
 Zoology, see Biology





378.73

L5242

1930/31

378.73

L5242

1930/31

DATE DUE

PBL MAR 27 '84

PBL MAR 23 '84

20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

LEHIGH UNIVERSITY

BETHLEHEM, PA.

